The RUBBER AGE

August, 1945

TECHNOLOGY DEPT.

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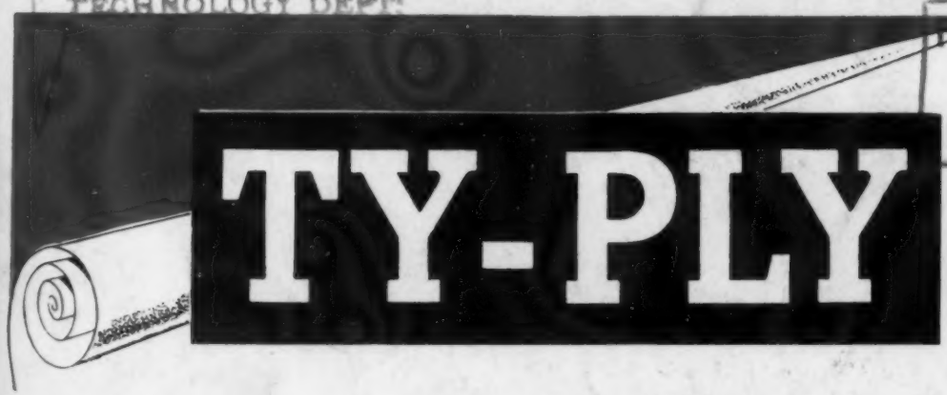


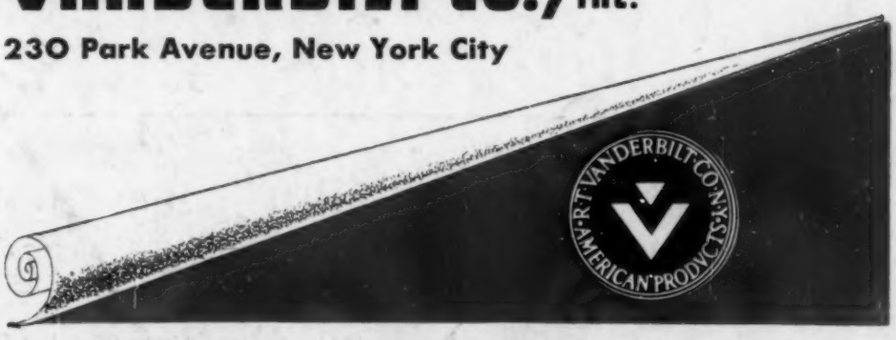
TY-PLY

For Bonding Rubber to Metal

- TY-PLY is doing a fine job on military products where good bonding of Rubber-To-Metal is required.
- Civilian rubber goods will soon be in big demand and TY-PLY will be just as useful here as in war goods for good bonding to metal.
- There is a TY-PLY for each of the several types of Rubber the industry will require.

R. T. VANDERBILT CO., INC.

230 Park Avenue, New York City



Newsletter No. 8
AUGUST 1945

Published by Rubber Chemicals Division of DU PONT

Announcing A New LOW Price for Neoprene Latex

25¢ per pound dry weight for Type 571 in tank cars. Other types proportionately reduced.

The excellent properties of articles made from NEOPRENE LATEX are recognized and accepted throughout industry. It has not always been possible, however, to use neoprene latex because of economic considerations. With this *new low price* the makers of neoprene latex believe you can produce superior articles with unusual economy.

- Sunlight Resistance
- Oil Resistance
- Excellent Aging
- Flame Resistance

These properties can be incorporated into your product to produce a superior article with real advantages for your post war business.

Use neoprene latex for anything formerly made from natural rubber latex. It's economical and better.

Type 571 for general purpose use

Type 572 for fast-setting adhesives

Types 571 Conc. & 60 for foam sponge, dipped goods and other items requiring high solids.

BUY WAR BONDS

DU PONT

RUBBER CHEMICALS DIVISION

BETTER THINGS FOR BETTER LIVING . . . *Through Chemistry*

THE RUBBER AGE, published monthly by The Palmerton Publishing Co., Inc., Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 250 West 57th Street, New York 19, N. Y. Entered as second class matter October 20, 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $3.00 a year; Canada, $3.50; Foreign, $4.00. August, 1945, Vol. 57, No. 5.

Air hose made from HYCAR will last longer, lower maintenance, save money
Photo courtesy Erie Railroad Company
AIR HOSE is a good example of why Hycar synthetic rubber is an ideal material for many uses in the railroad industry.
The picture shows the kind of treatment air hose gets. It has to be tough. And a hose made from Hycar will resist abrasion 50% better than hose made from natural rubber. Air passing through the compressor picks up oil and carries it into the hose. Oil destroys natural rubber. Yet Hycar is practically unaffected by oil and grease, even at high temperatures. Air hose is used in all kinds of weather. Unlike natural rubber, Hycar strongly resists the action of sun and aging, and remains virtually unchanged over a wide range of temperatures.
All this can be directly translated into actual savings of money through longer life and lower maintenance costs—not only of hose but of gaskets and seals of all kinds, mountings and bushings, mats and flooring, vibration dampeners, sealing strips, and many other items.
Examine the list of properties in the box at the right, keeping in mind the requirements of your rubber parts. Then, ask your supplier for parts made from Hycar. Test them in your own applications—difficult or routine. You'll learn for yourself that Hycar can help you reduce operating costs—that it's wise to use Hycar for long-time, dependable performance.
Hycar Chemical Company, Akron 8, O.
CHECK THESE SUPERIOR FEATURES OF HYCAR
Hycar
Reg. U. S. Pat. Off.
LARGEST PRIVATE PRODUCER OF BUTADIENE TYPE
Synthetic Rubbers
Why don't you start "workin' on the railroad"?

THE advertisement shown here appeared recently in *Railway Mechanical Engineer,* a leading railroad publication. It tells men in the railroad industry — men who influence the purchase and use of rubber parts—how parts made of Hycar synthetic rubber can help them reduce expenses and lower maintenance time.

But the only place they can get these Hycar parts is from *you.* That's why we tell them—*ask your supplier for parts made from Hycar.*

We make no finished parts of Hycar. We can only supply you the raw synthetic rubber from which parts can be made. That's why the next move is up to you. We have opened the door—now you can get inside.

Hycar is giving you the same advertising support in other industries—aviation, automotive, petroleum—in fact, *all industry.*

Reprints of all Hycar advertisements are available for use by your salesmen at no cost to you. Please send your requests to *Hycar Chemical Company, Akron 8, Ohio.*

Hycar

Reg. U. S. Pat. Off.

LARGEST PRIVATE PRODUCER OF BUTADIENE TYPE

Synthetic Rubbers

One Third More Philblack A

NOW AVAILABLE to Manufacturers of Rubber Products!

Good news for makers of tires, tubes and other rubber articles! We've increased our production of Philblack A by about 36% ...16 million more pounds per year... and that means that a lot more better rubber products can be made with Philblack A!

Do you know what Philblack A really can do in helping you solve your problems? Here are just a few of its advantages. Even a little Philblack A mixed with other blacks lowers processing time ... lowers power consumption ... improves tubing ... and in finished products lowers hysteresis ... increases abrasion resistance ... improves cut and crack growth resistance. What more do you want?

PHILLIPS PETROLEUM COMPANY

Philblack Division

FIRST CENTRAL TOWER · AKRON, OHIO

Water-borne polyvinyl resins provide safer, simpler coating methods

GEON latex is a film-forming plastic material used to apply thin coatings to fabric, paper, fibre, thread, wire or any other material to which coatings can be applied by conventional methods. It is a true latex—a water dispersion containing a solid content of approximately 50% vinyl resin. Especially suitable for use in continuous processes, GEON latex is an easy-flowing, milk-like liquid of remarkably high stability. It is *not* rubber and contains *no* rubber.

When suitably formulated GEON latex can be used with standard coating equipment. Variations in viscosity can be obtained to make GEON latex suitable for use with such machines as knife spreaders, air knife coaters, roller applicators and continuous dip tanks.

In addition to the natural economy and simplicity of processing, GEON latex, being a water system, offers safety advantages not to be found in solvent systems. The dangers of toxicity and explosion are eliminated. Dangerous, expensive and cumbersome solvent recovery systems are unnecessary because no solvent is used.

GEON latex, like all latices, has its limitations. It is not a "miracle material", that will do away with other coating methods. Yet already its use in military and related applications has proved that entire new fields in coatings will be opened up by this new material, the development of which was a true scientific achievement. For more information, write Department KK-8, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

Geon
Polyvinyl Materials

B. F. Goodrich Chemical Company

A DIVISION OF
THE B. F. GOODRICH COMPANY

And there's more where that came from!

"Don't worry!"

That good advice is directed to men in the rubber industry who are wondering what will happen when the present supply of natural scrap rubber is exhausted. They are wondering what they will do without this stable, dependable compounding material that they have used for so many years in their rubber products.

Take a look at the picture on this page. Present collected stocks of natural scrap—which that pile represents—will last at least the rest of this year, probably considerably longer.

And there's more where that came from.

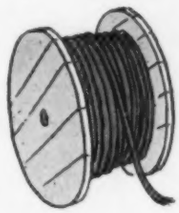
In the 142,000,000 tires now in service—most of which have natural rubber carcasses—we have a scrap supply that will assure at least 2 more years' production of black reclaim.

So don't worry!

Finally, when synthetic scrap starts coming in in quantity, Philadelphia Rubber will know what to do about it. Already—thanks to the accelerated research brought on by the war—we have a thorough knowledge of how to reclaim synthetic scrap properly.

If you have any questions or any problems that have to do with reclaimed rubber—natural or synthetic—please call on our technical staff for help. The Philadelphia Rubber Works Company, 324 Rose Building, Cleveland 15, Ohio.

PHILADELPHIA
RECLAIMED RUBBER



MULTI-PLAST

for MULTI-PURPOSE COMPOUNDING

MULTI-PLAST, a high quality plasticizer of the sulfur-reactive type, is now being used for all types of compounding in the production of a variety of rubber goods. Its wide acceptance has proven that it can do a good job at low cost. If you have a processing or compounding problem, MULTI-PLAST may be the answer.

W C C

REG. U. S. PAT. OFFICE

WILMINGTON

CHEMICAL CORPORATION

10 EAST 40TH STREET • NEW YORK 16, N. Y.

25 YEARS EXPERIENCE in LINER PROCESSING

Since 1922 Climco Processed Liners have served the rubber industry. Quickly acknowledged as the best method of processing liners, the Climco treatment is today unrivaled in popularity.

Over the years we have gained valuable experience about the proper way to use liners under varying production conditions and with different stocks. We are always glad to consult with you about your liner problems.

If you are not already familiar with Climco Liners, write for complete information. Once you have used Climco Liners, you will soon be convinced it pays to *standardize* on Climco.

NEW **BOOKLET**

tells how to get better service from your liners. Illustrated with diagrams. Tells how to use liners more efficiently. Write for your copy now.

LINERETTE
INTERLEAVING PAPER
Treatment Contains
NO OIL OR WAX
Samples on Request

THE CLEVELAND LINER & MFG. CO. TRADE CLIMCO MARK CLEVELAND, OHIO, U.S.A.

THE CLEVELAND LINER & MFG. CO.
5508 MAURICE AVENUE • CLEVELAND 4, OHIO

CLIMCO PROCESSED LINERS

for Faster, Better Production at Lower Cost

WHAT'S THIS?..
HOLLAND FROM A TEST TUBE?

THE Holland of Queen Wilhelmina was not the only Holland that fell victim of the Nazis. The rubber man's holland, a glazed chintz-like material used as backing for uncured gums, also went by the boards when war struck. What to do? Camelback tread rubber, cushion gums, and similar recapping and repair materials were needed in *tremendous* quantities to keep essential war transportation rolling. But how to market such tacky products with our *limited* supply of holland?

The problem was turned over to the Butaprene technical staff. Working with Butaprene latices in various combinations, the Butaprene staff developed a coating for ordinary cotton cloth that makes a backing that's not only better, but *much cheaper* than holland cloth. This is only one of the countless new uses industry is finding for the new Butaprene rubbers. Why not see what Butaprene-N will do for you? The Butaprene technical staff is ready to help with any problems involving the Butaprene rubbers in latex or plastic form. Simply write XYLOS RUBBER COMPANY, Akron 1, Ohio.

BUTAPRENE N by Firestone

THE SYNTHETIC RUBBER OF A THOUSAND POSTWAR USES

Listen to the Voice of Firestone every Monday evening, over N. B. C.

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Dipex* is freely soluble in water...

A MOLDING COMPOUND of wide usefulness to manufacturers of many kinds of rubber products, Dipex offers these outstanding advantages:

- Can be used to mold light-colored or white goods
- Freely soluble in water
- Can be applied by spraying, brushing or dipping
- Gives clean, sharp designs
- Anti-stick . . . Free of deposit forming constituents

Valuable technical data and free samples yours on request

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Compounded Latex and Dispersions

for Coating, Saturating and Bonding Fibrous Materials

Naugatuck Chemical

DIVISION OF UNITED STATES RUBBER COMPANY

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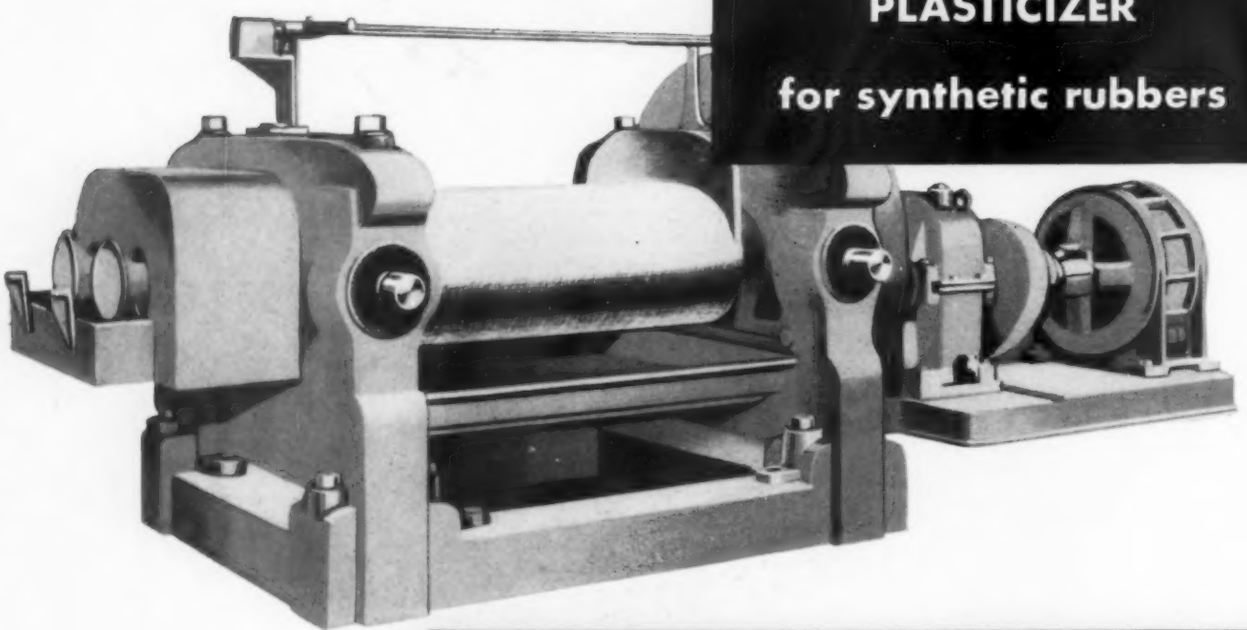
WORLD'S LARGEST PRODUCER OF SYNTHETIC RESINS

RCI

answering your demand

for a trustworthy
PLASTICIZER
for synthetic rubbers



RCI
Controlled-Quality

DIBUTYL PHTHALATE

RCI has resumed quantity production of the proved plasticizer for Vinyl, Neoprene and Buna N types of synthetic rubber—dibutyl phthalate. And with the return of this basic chemical to RCI's Line of Raw Materials comes reassurance of uniformity from batch to batch because RCI's system of control guarantees constant quality. Meeting Army Specification 50-11-61A and Army-Navy Specification AN-O-D-361, RCI Dibutyl Phthalate is thoroughly dependable. For further information write direct to the Sales Department.

Saturday Evenings at 8:30 (E.W.T.)
You Will Enjoy RCI's
"Symphony of the Americas"
Via Mutual Network Stations

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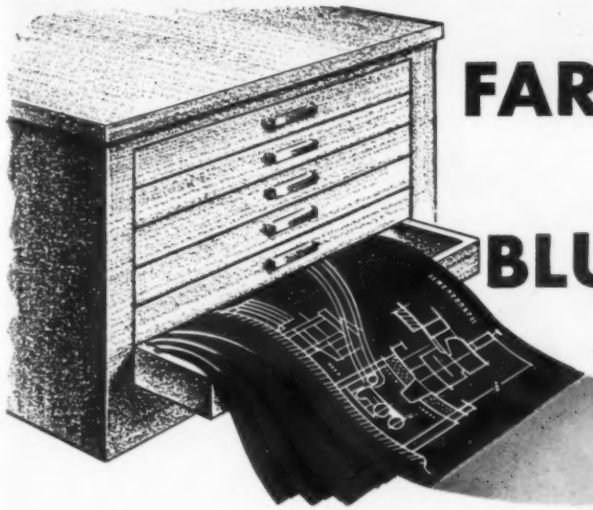


FARREL-BIRMINGHAM HAS A BLUEPRINT MEMORY OF *your* BANBURY

WHEN your Banbury needs repair, remember that Farrel-Birmingham is the only company that has the 2,200 square feet of blueprints which show the original dimensions of each of the 775 parts of your machine. 242 of these parts are machined and the prints show each of the 882 operations performed on them. This information is essential in returning a worn Banbury to its original capacity and efficiency.

The Banbury repair procedure developed by the company consists of a carefully planned and controlled sequence of operations, which makes certain that every vital part of the mixer is brought back to the exact contour and dimensions specified on the original blueprints. For example, the rotors are routed through 42 repair operations, including three physical tests which check the soundness of the finished repair.

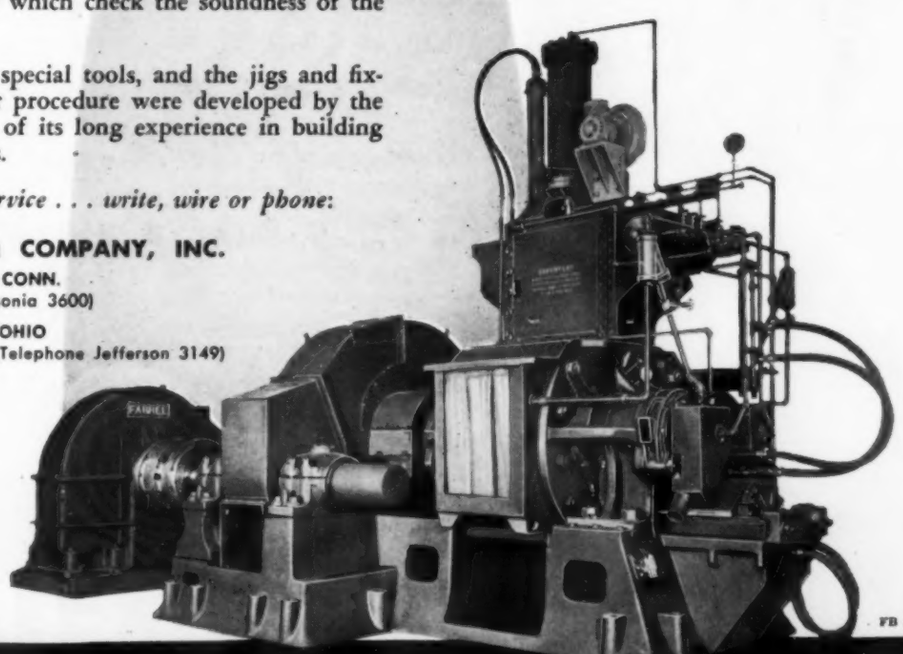
Specialized techniques, special tools, and the jigs and fixtures used in the repair procedure were developed by the company in the course of its long experience in building and repairing Banburys.

For quick repair service . . . write, wire or phone:

FARREL-BIRMINGHAM COMPANY, INC.

ANSONIA, CONN.
(Telephone Ansonia 3600)

AKRON, OHIO
2710 First Central Tower (Telephone Jefferson 3149)



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CRUDE
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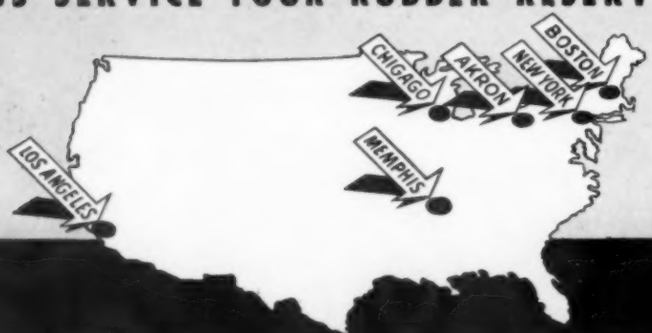
Rubber

Also HARD RUBBER DUST *and* BALATA

Muehlstein facilities will save you much time and effort. Our organization is geared to give you service when, where and as you want it.

Consult Our Nearest Office

LET US SERVICE YOUR RUBBER RESERVE PERMITS



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6½ Gallon Carboy

Completely Enclosed

Screw Cap Closure

POURS EASILY

HANDLES EASILY

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Featuring!

✓ **"ONE-MAN" PACKAGE**
Compact . . . saves labor . . . lower gross weights make possible *one-man* handling and storage—

	Gross
Sulfuric Acid	138 lbs.
Nitric Acid	113 lbs.
Hydrochloric Acid	102 lbs.
Ammonium Hydroxide	86 lbs.

✓ **"PURITY SEAL" COVER**
Completely encloses bottle, keeps out dirt, prevents sunlight damage to pure acids.

✓ **POUR-CLEAN LIP**
Superior pouring control . . . easier emptying into small containers.

✓ **SCREW-CAP CLOSURE**
Added security in sealing, yet simpler opening and closing. Keeps bottle neck clean, protects acid from contamination.

✓ **SAVES STORAGE SPACE**
Store *more* acid in *less space* . . . rectangular solid package with reinforcing corner posts adaptable to storage in solid tiers, or on pallets. Takes less room than commercial carboy with protruding neck.

✓ **"FULL VIEW"**
Contents completely visible . . . acid level easily determined.

✓ **EXTRA STRENGTH BOTTLE**
Designed for superior strength and uniformity.

✓ **RESISTANT COATING**
Entire box weather-proofed for longer life and better appearance.

"THE CARBOY OF TOMORROW" Today!

For B & A Reagent Acids and Ammonia

Chemical packaging makes a significant advancement with the advent of the new 6½ gallon, screw-cap, completely boxed carboy . . . and General Chemical Company leads the way by pioneering this superior modern container for its Baker & Adamson Reagent Acids and Ammonia.

Here is a carboy that protects the high purity of B&A products and safeguards their quality for the user even under adverse conditions. Study its many special features. Note how they provide an ease of handling and storage impossible with ordinary carboys.

These are advantages industrial users of reagent acids, laboratories, colleges and others will welcome as the answer to their special requirements. You will want them, too . . . so order B&A Reagent A. C. S. Acids and Ammonia in this new carboy *now*. Limited shipments soon to all points east of the Rockies.

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GENERAL CHEMICAL COMPANY

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Retarder-Activator: Prevents scorching at processing temperatures, but activates at curing temperatures.

Increases raw stock strength with all types of pigmentation.

Faster, smoother tubing and non-sagging stocks.

Aids in dispersion of all pigments and particularly channel blacks and hard clays.

Lowers temperature, power consumption and time of Banbury mixing.

Exceptional cure leveler for fast curing stocks.

Improves resistance to tear, aging and cold flow or "growth" of cured articles.

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2412 FIRST CENTRAL TOWER
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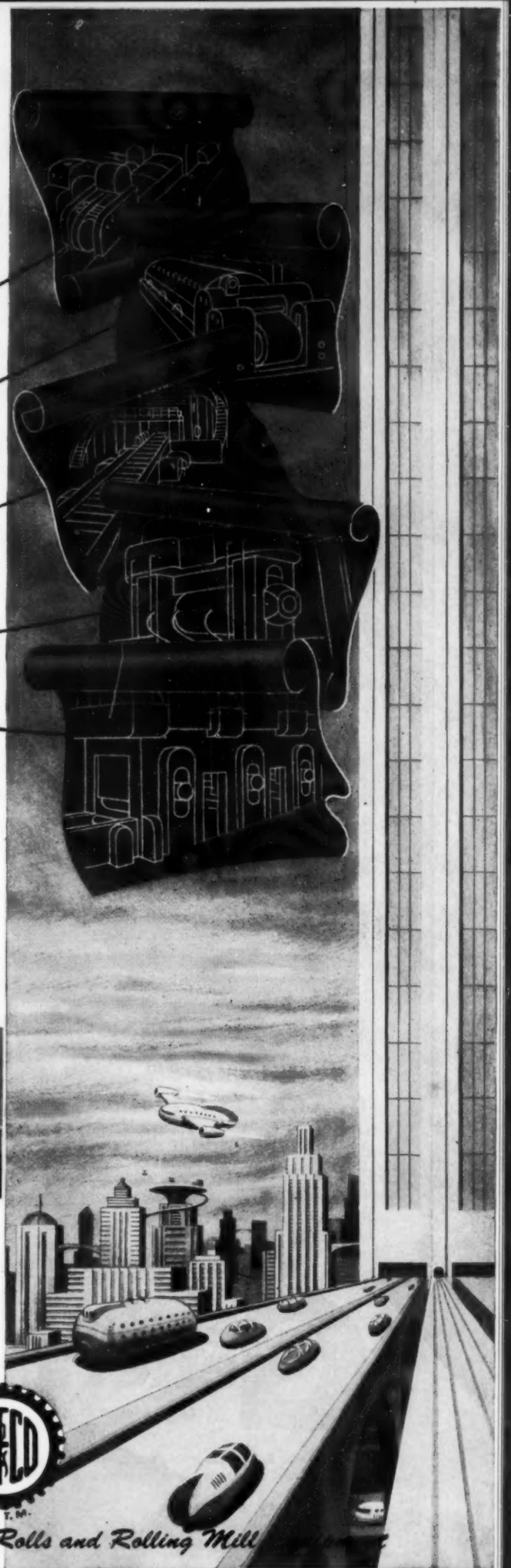
UNITED'S engineers, outstanding contributors to the progress of the rolling industry for the past 40 years, are today engaged in developing improved processes and machinery to meet tomorrow's radically advanced and highly competitive manufacturing requirements.

Executives charged with reconversion to the economical processing of metals, rubber or synthetic resins, should investigate UNITED'S ability to serve them, whether their problem is the replacement of present worn-out equipment; the construction and installation of modern processes within their present plants; or the design and erection of completely new, fully equipped plants.

Thoroughly experienced engineering and research staffs plus the productive capacity of UNITED'S six great manufacturing organizations are at the service of the industry.

shape of things to come



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Custombuilt

FOR THE ARMED FORCES

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- **Synthetic Raincoats, Ponchos, and Clothing Bags — U. S. Army**
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- **Bomber Runway Carpets — U. S. Army Air Corps**
- **Woven Glass Tubes for insulation of aircraft fuel and oil lines**
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- **Three-Dimensional Flexible Topographic Maps—U. S. Marine Corps**
- **Shoe Adhesives — U. S. Army and U. S. Navy**

GRS latex types, 2, 3 and X-160, normal and concentrated, available from stock

General Latex & CHEMICAL CORP.

666 MAIN STREET, CAMBRIDGE, MASS.

Agents for Rubber Reserve Company for storage and distribution of natural rubber latex. Distributors for Rubber Reserve Company for synthetic latex. Operators of the Government-owned Baytown, Texas, synthetic rubber plant in collaboration with the General Tire & Rubber Co.

YOU'RE SAFE...

when you specify

the Versatile Resin

The *dependable uniformity* of PICCOLYTE is an important feature today. This unique synthetic resin has many characteristics that make it useful for extending, tackifying and cementing.

Piccolyte is pale in color and non-yellowing, an important factor for many rubber uses. Being low in cost and soluble in low-cost naphthas, it is economical to use. It is chemically inert, thermoplastic, and made in several types and grades having different properties.

Due to heavy demands for Picco Products, we are sometimes unable to guarantee prompt deliveries of certain types. However, we will be glad to help you select the proper types and grades for your particular use, and schedule the earliest possible delivery for your orders.

★ WRITE for bulletins giving grades, properties and uses.

Pennsylvania
Industrial Chemical Corporation
Clairton, Pennsylvania

Distributors to the Rubber Industry — STANDARD CHEMICAL CO., AKRON, OHIO

Makers of: Coumarone Resins • Coal Tar Naphthas • Styrene Resins
Rubber Plasticizers • Reclaiming Oils • Terpene Resins

Wanted....

Technical Representative on latex, latex chemicals, LOTOL and dispersions of rubbers and resins.

A man experienced in the rubber industry and having a chemical or engineering background will find this an unusual opportunity with an attractive future.

Write qualifications in initial letter to arrange a personal meeting in Akron, Detroit, Boston or New York. Letters will be held in strict confidence.

Lotol and Latex

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Division of United States Rubber Company

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BRANCHES: AKRON — BOSTON — DETROIT

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Plasticizer and Extender for GR—S

Chemically and physically Controlled

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Tensile Strength

Resistance to aging

Dielectric strength

Write Our Technical Service Dept. for Details

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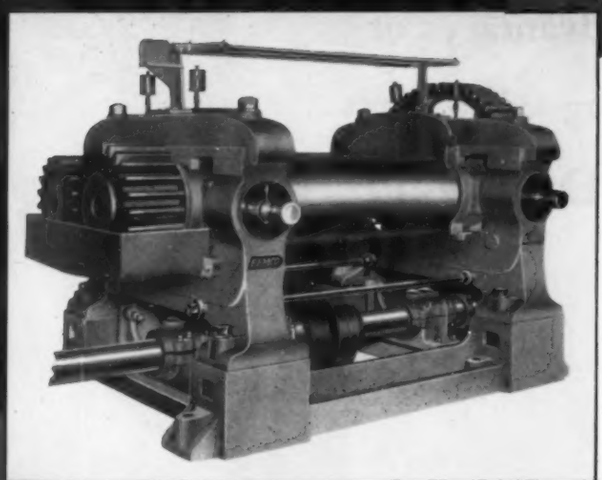
MILLS... REFINERS

FOR RUBBER *and* PLASTICS PROCESSING

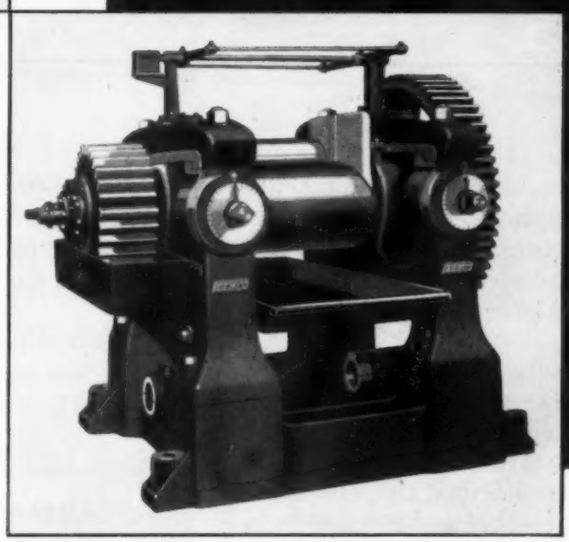


Mills

EEMCO HEAVY DUTY MILLS are correctly designed, carefully constructed and exceptionally strong in the parts subject to heavy strains. Write for Bulletin describing the newly designed 12 inch Laboratory Mill or heavy duty mills, which are made in various sizes up to 84 inch.

Refiners

FOR BREAKING DOWN AND CRACKING both natural and synthetic rubber, EEMCO Refiners and Crackers are made to insure maximum production plus great endurance. Furnished with either one or both rolls corrugated. EEMCO engineers are trained in rubber working and plastics processing problems — their help and advice is yours for the asking. If your requirements include any of the machines, listed below, write us for details.



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953 EAST 12th ST., ERIE, PENNA.

Now...

ROAD TESTS

Confirm Advantages of Compounding GR-S Tires with RED LEAD

Heat build-up and heat stability both improve when you compound GR-S tires with Red Lead-Thiazole acceleration—as indicated in data previously presented.

Now comes confirmation of these advantages . . . results of both wheel and road tests on tires in which GR-S–Red Lead compounds were used throughout, for tread, breaker and carcass stocks, in regular plant runs.

In the wheel tests, the GR-S–Red Lead tires exceeded the comparison standard by 50%—conclusive proof of improvement in both heat build-up and heat stability.

This has now been borne out in road tests on the San Antonio course. Standard 4-ply 6.00 x 16 tires were used, at 60 miles per hour, with a 25% overload, on cars running continuously twenty hours a day.

At 21,000 miles the treads wore smooth, leaving the tires with no structural failures and in excellent condition—ready to take a GR-S–Red Lead retread and continue to give thousands of miles more of useful service.

Further Information *will gladly be supplied by the Rubber Division of our Research Laboratories.*

ADVANTAGES OF COMPOUNDING GR-S WITH RED LEAD

1. Imparts improved heat resistance—retention of elasticity
2. Imparts improved heat build-up—cooler running
3. Excellent general physical properties
4. Safe processing
5. Broad curing plateau—very little change in properties on overcures
6. Economical
7. Available

NATIONAL LEAD COMPANY New York 6, Buffalo 3, Chicago 80, Cincinnati 3, Cleveland 13, St. Louis 1, San Francisco 10, Boston 6 (National-Boston Lead Co.); Pittsburgh 30 (National Lead & Oil Co. of Penna.); Philadelphia 7 (John T. Lewis & Bros. Co.)

you should read "rolling on RAYON"

because Rayon for Tires is here to stay

If you want to be up to the minute on tires, here's a booklet just for you.

The war has brought many changes in the tire picture and one of the most important of these is in the use of rayon cord. When the Army found that rayon made natural rubber tires *better* and heavy-duty synthetic rubber tires *possible,* rayon tire yarn production was increased to more than 20 times its prewar capacity. It isn't hard to imagine the part rayon will play in tires of the future. So . . .

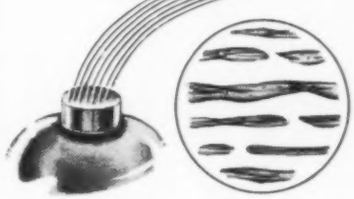
Send for it!

Read it!

Remember it!

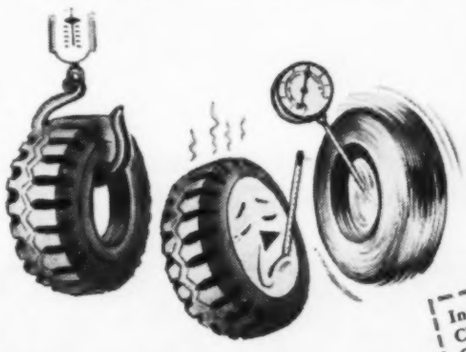
FREE JUST ASK FOR A COPY. USE THE COUPON BELOW.

it will tell you



How rayon differs from natural fibers—how rayon is made in one long continuous strand as against the short, irregular fibers of nature.

The advantages rayon offers in natural and synthetic rubber tires—how rayon makes a safer tire, a lighter tire, a cooler-running tire, a longer-lasting tire.



How rayon is made—how every step in production can be controlled to achieve utter uniformity, so essential to tire-making and tire performance.

Industrial Rayon Corporation (Dept. B)
Cleveland, Ohio
Gentlemen:
Please send copy of "Rolling on Rayon."
Name .....
Address .....
City .....
Company Name .....

TYRON*

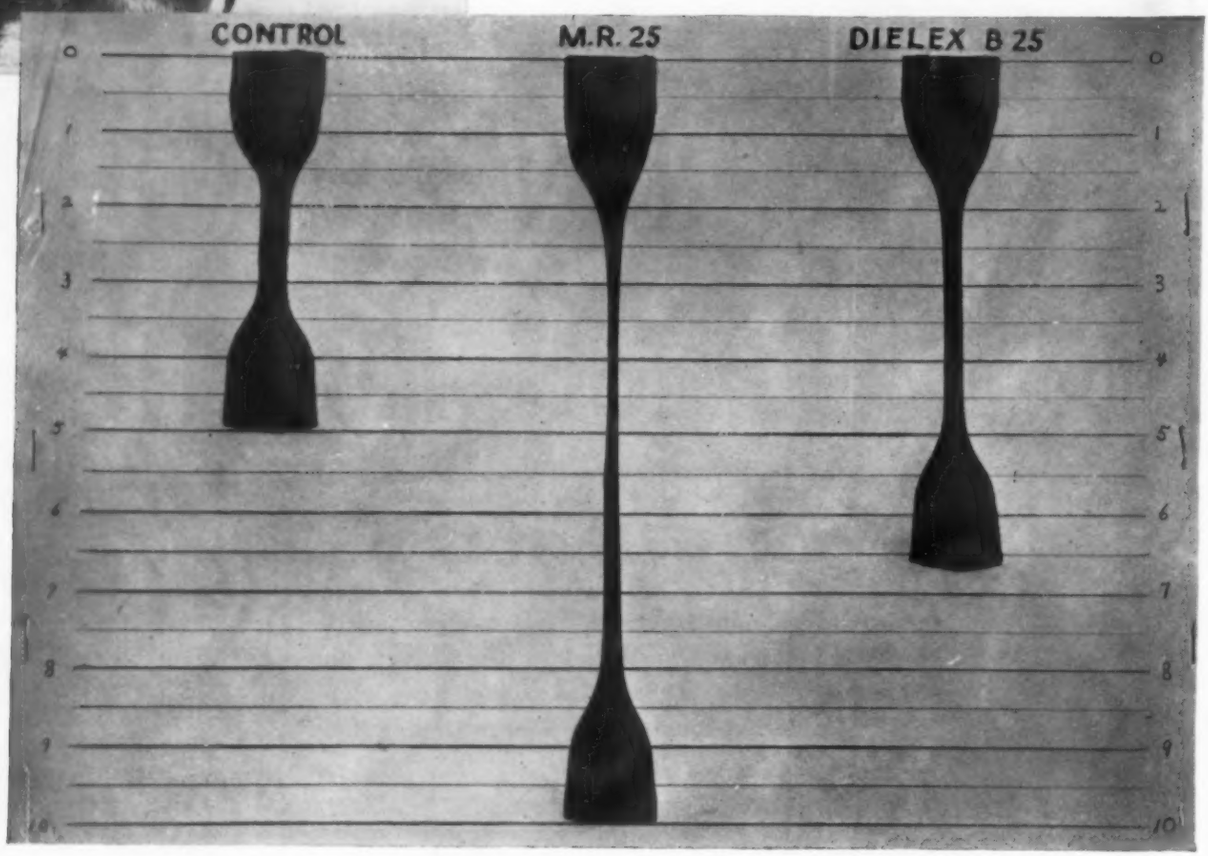
*Reg. U. S. Pat. Off.

rayon for tires

INDUSTRIAL RAYON CORPORATION
Cleveland, Ohio

ARE YOUR COMPOUNDS SAGGING DURING HOT WEATHER?

You can't feed a dog Dielex B but you can incorporate it in your stocks to minimize sagging.



Plastic Flow Of Uncured GR-S Stocks After 40 Min. At 245° F With An 18 Gram Weight Attached To Each.

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PIGMENTS
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516 OHIO BUILDING, AKRON, OHIO
SUPPLIERS OF RUBBER CHEMICALS

Significant new data for compounders of GR:S stocks

The Effects of Ethylene Glycol on the Properties of GR:S Stocks Containing

SILENE EF

Recent experiments in Columbia Laboratories indicate favorable results through the addition of Ethylene Glycol to GR:S stocks loaded with various volumes of Silene EF. Stocks treated in this manner cure at a more rapid rate . . . hysteresis heat buildup is lowered materially . . . and the general "snappiness" is improved.

The results of these experiments are contained in Columbia Pigments Data Sheet No. 45-1. Copies may be obtained on request to our General Offices.

COLUMBIA CHEMICALS

PITTSBURGH PLATE GLASS COMPANY
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GRANT BUILDING • PITTSBURGH 19, PA.

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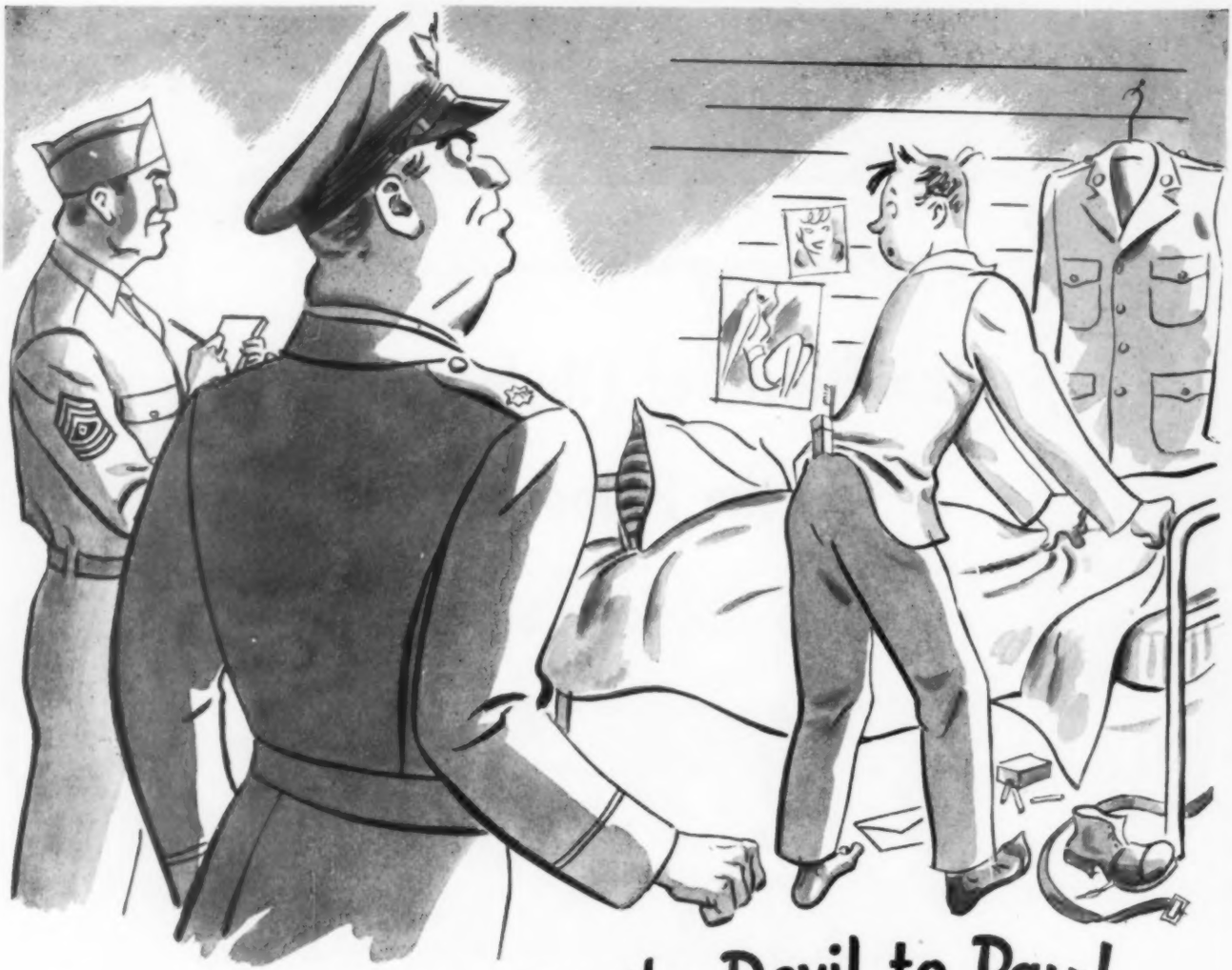

There's Going to Be the Devil to Pay!

Yes—and there's the devil to pay in your plant if lack of uniformity in solvents throws the whole production line out of gear.

But—you can avoid that headache by specifying SKELLYSOLVE. A given type of SKELLYSOLVE ordered tomorrow, or any time, will be identical in characteristics with that same type ordered now. SKELLYSOLVE means dependable uniformity, because, in refining it, we depend on *accurate, scientific, instrumented quality control.*

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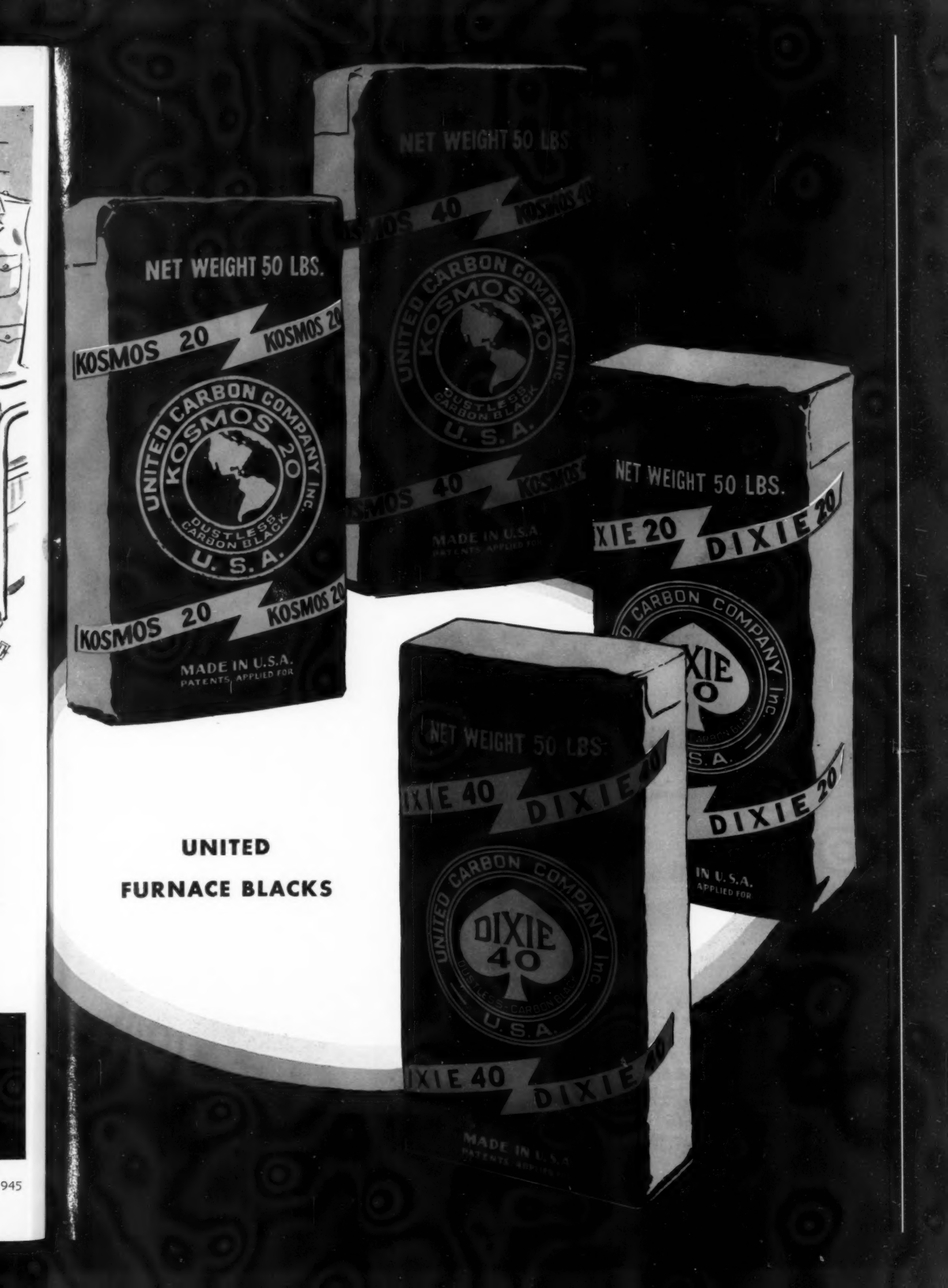
SKELLY

SKELLYSOLVE
in the
RUBBER INDUSTRY

There are six different types of Skellysolve which are especially adapted to various uses in the rubber industry, for making rubber cements, and for many different rubber fabricating operations. Skellysolve offers many advantages over benzol, rubber solvent gasoline, toluol, carbon tetrachloride, etc. It will pay you to investigate Skellysolve. Write today.

SKELLYSOLVE

SOLVENTS DIVISION, SKELLY OIL CO.
SKELLY BLDG., KANSAS CITY, MO.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KOSMOS 20
UNITED CARBON COMPANY INC.
KOSMOS 20
DUSTLESS CARBON BLACK
U. S. A.
KOSMOS 20
KOSMOS 20
MADE IN U.S.A.
PATENTS APPLIED FOR
NET WEIGHT 50 LBS.
KOSMOS 40
KOSMOS 40
UNITED CARBON COMPANY INC.
KOSMOS 40
DUSTLESS CARBON BLACK
U. S. A.
KOSMOS 40
MADE IN U.S.A.
NET WEIGHT 50 LBS.
DIXIE 20
DIXIE 20
DIXIE 20
NET WEIGHT 50 LBS.
DIXIE 40
DIXIE 40
UNITED CARBON COMPANY INC.
DIXIE 40
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UNITED
FURNACE BLACKS

USE THESE UNITED BLACKS
for
UNIFORM QUALITY AND PERFORMANCE

DIXIE 20 • KOSMOS 20

United Furnace Blacks of the semi-reinforcing (SRF) type. They are ideal for GR-S and other rubbers used in military and civilian goods. Their outstanding features are ease of processing—good plasticity—fast rate of cure—high resiliency and low heat build up. We recommend them for blending with channel black for moderate reinforcement and low heat build up.

•

DIXIE 40 • KOSMOS 40

United Furnace Blacks of the reinforcing (HMF) type for synthetic and natural rubber. They possess a combination of most desirable characteristics, including cool mixing—easy processing—smooth and rapid extrusion—fast rate of cure—full reinforcement—low heat build up and high resiliency. They also possess high resistance to cut growth—flex cracking and abrasion. They are especially useful for tires of all types, pneumatic or solid, under any conditions; tubes; bogie wheels; footwear; and mechanical goods.

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Pioneer in water systems seeks problems relating to paper and textile treatment

THERE are three good reasons why American Anode water dispersions of natural and synthetic rubbers and plastics can be used to advantage in treating fabrics and paper.

First, there's the *experience* that American Anode has accumulated over a period of many years. American Anode pioneered the work with water dispersed rubbers and plastics. That's why we invite you to submit your paper and fabric treatment problems to our development laboratory staff. We honestly believe that we can help you because we *know* how to use water dispersions most effectively.

Second, there's *economy.* Water systems do away with the need for expensive solvents and cumbersome solvent recovery systems. Processing is simplified. In most cases, it actually *costs less* to treat fabrics or paper using a water dispersion.

Third, there's *safety.* Water just won't explode, causing dangerous and expensive fires. Nor will water give off toxic fumes. Our laboratory facilities and research staff are at your service. For more information please write American Anode, Inc., 60 Cherry Street, Akron, Ohio.

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NATURAL AND SYNTHETIC RUBBER LATICES, WATER CEMENTS AND SUSPENSIONS

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Serving the *RUBBER INDUSTRY* Since 1892

Designers and Builders of STANDARD AND SPECIAL MACHINERY *for the Rubber Industry*

For more than 50 years ADAMSON has pioneered in the design and construction of basic rubber processing machinery, contributing, through constant research and development, many outstanding and revolutionary improvements to the industry. ADAMSON processes and equipment are in present operation in many of the country's largest rubber manufacturing plants.

Always possessed of adequate production facilities, recent reorganization and expansion provide even greater manufacturing capacity and a more comprehensive engineering and research service for the development of new processes and equipment.

Consult us Our experience and abilities are at your service.

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- Calenders . Mills
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Typical recipes for various stocks, together with reports on characteristics and performance obtained in laboratory tests.

Contains technical data on 20 Barrett rubber compounding materials; also convenient conversion tables.

COMPLETE NEW MANUAL

Every rubber chemist will want a copy of this new 8½ x 11 inch, 36-page illustrated booklet. We believe that it is the most complete and usable reference manual on coal-tar rubber compounding materials that has ever been published. It gives specifications, characteristics and behavior with rubber of 20 Barrett compounding materials.

A pocket in the back of each book holds a selection of Barrett Rubber Laboratory releases which are examples of the use of Barrett materials in several types of stock.

Your copy will be mailed to you on request. Please write on your firm letterhead.

Awarded to men and women of the Barrett Frankford Chemical plant.

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Barrett

PARAPLEX G-25

gives you these 9 advantages in vinyl resin compounds

1. PERMANENCE: The extremely low volatility of PARAPLEX G-25 approximates that of polyvinyl chloride itself. Because softness and thermoplasticity of this synthetic resin are not affected by aging or exposure, PARAPLEX G-25 plasticized compounds are truly permanent, even under most rigorous conditions.

2. LOW FLAMMABILITY: Plastics or plastic coatings made with PARAPLEX G-25 do not support combustion ...are therefore particularly well suited for fabrics and electrical insulation where fire-resistance is a prime requisite.

3. FLEXIBILITY AT LOW TEMPERATURE: Vinyl resins plasticized with PARAPLEX G-25 show low temperature flexibility adequate for all uses except the most highly specialized applications. The bend-brittle point of such stocks compares favorably with most ester type plasticized compounds.

4. HEAT STABILITY: PARAPLEX G-25 compounds show unusually low heat deformation and excellent retention of original flexibility...will not degrade the vinyl resins even at high temperatures.

5. NON-EXTRACTABILITY: PARAPLEX G-25 is insoluble in oils, fats, water and aliphatic hydrocarbons, making it possible for the first time to compound soft, flexible polyvinyl chloride stocks with excellent oil resistance.

6. NON-MIGRATABILITY: PARAPLEX G-25 does not spue or migrate from vinyl resin compositions at either high or low temperatures, an important consideration where freedom from lifting and the ultimate in adhesion are required.

7. FREEDOM FROM ODOR AND TASTE: Because this resinous plasticizer imparts no odor or taste to coating compounds, it is eminently suitable for food packaging, processing equipment, rainwear and wearing apparel, as well as other special applications where these qualities are essential.

8. RESISTANCE TO WEATHERING: PARAPLEX G-25-vinyl compounds are unaffected by heat, cold, sunlight or ultra violet. Even after long exposure, flexibility remains unimpaired.

9. EASE OF COMPOUNDING AND PROCESSING: PARAPLEX G-25 may be compounded readily in a Banbury or on a rubber mill at milling temperatures only slightly higher than for monomeric ester type plasticizers. Extruding and calendering operations produce stocks with particularly smooth finish, and high gloss surfaces.

No other plasticizer or plasticizer combination produces the outstanding effects obtained with PARAPLEX G-25. Be sure to investigate the merits of this radically new vinyl plasticizer. Detailed information will be sent promptly upon request. Send your inquiries to—The Rubber Chemicals Department, The Resinous Products & Chemical Company.

PARAPLEX is a trade-mark, Reg. U. S. Pat. Off.

THE RUBBER CHEMICALS DEPARTMENT

THE RESINOUS PRODUCTS & CHEMICAL COMPANY

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Custom tailor for a suit of armor

APPLYING wire braided armor or shielding to tubing, conduit or hose, is a custom tailoring job. Braiding can be applied directly to material to be covered, or the metal braid can be furnished in suitable lengths for the user to apply in his own plant during assembly operations.

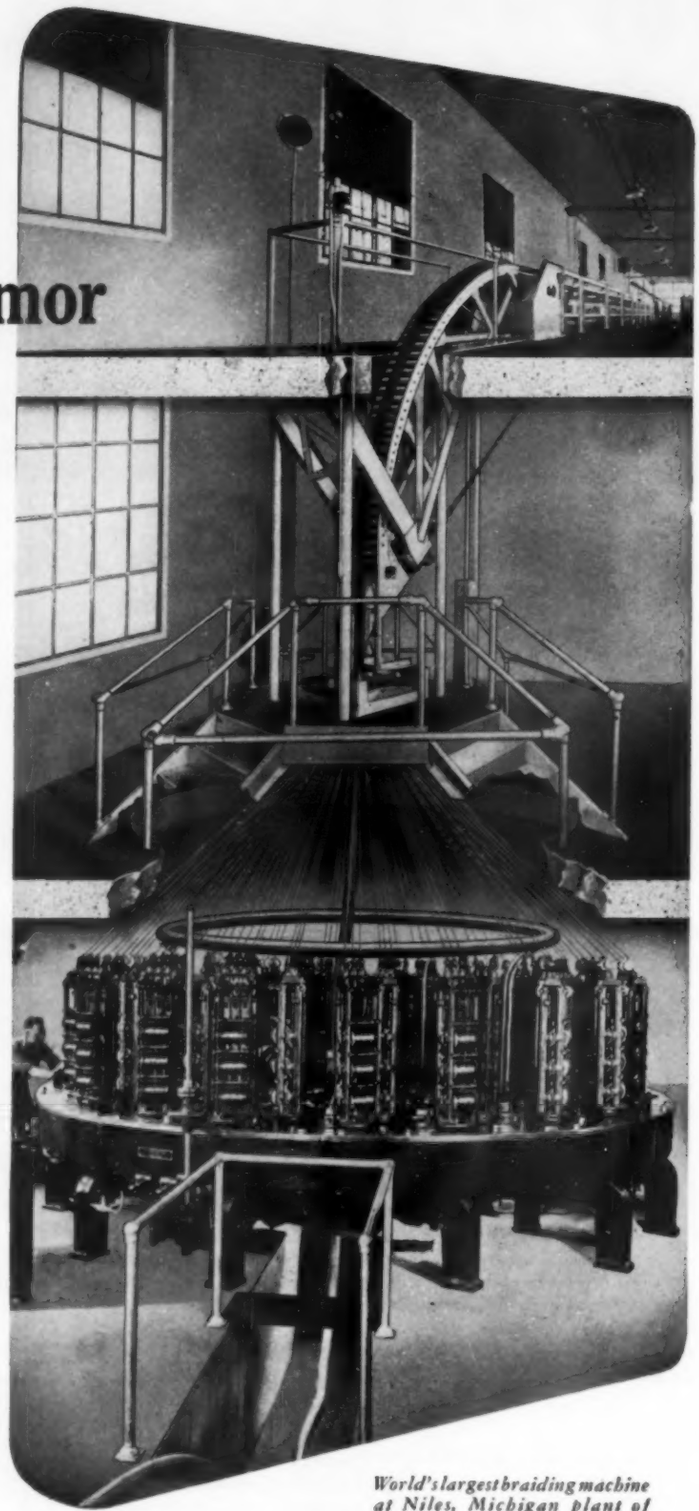
To provide the desired flexibility and other characteristics such as uniform coverage, resistance to mechanical abuse, resistance to elongation, or enlargement of diameter, braiding wire must be applied at precisely the correct angle and there must be no variation from this . . . from start to finish of the job.

That's why for fine radio wire 1/16" in diameter, or 16" steam expansion joints, more and more companies are calling upon National-Standard for their wire braiding work. For, we at National-Standard have the knowledge and experience necessary to give you a custom tailored job of braiding to meet exactly your particular requirements.

Today at National-Standard we have machinery available to braid steel, brass, copper, stainless steel, and monel metal. Let our 38 years of experience in the wire and wire fabricating industry help *you* with your braiding problem.

BUY AND KEEP WAR BONDS AND STAMPS

NS
NATIONAL-STANDARD Company
NILES, MICHIGAN



World's largest braiding machine at Niles, Michigan plant of National-Standard Company.

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TIRE WIRE, FABRICATED BRAIDS AND TAPE

THE ATHENIA STEEL CO.
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COLD ROLLED, HIGH-CARBON SPRING STEEL

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NEVILLE

TOLLAC
NEVSOL

These solvents have helped to relieve the critical rubber shortage during the war

Because of their high nitrocellulose tolerance and excellent evaporation qualities these solvents have enabled many rubber and other manufacturers to keep their plants operating when they couldn't obtain toluol. They are currently available as Class A Solvents under WPB Conservation Order M-150.

★ *Postwar grades of Tollac and Nevsol, having much higher solvency and nitrocellulose tolerance, will be available as soon as solvent restrictions are lifted. Keep them in mind for your postwar finishes.*

THE NEVILLE COMPANY
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RECLAIMING, PLASTICIZING, NEUTRAL, CREOSOTE, AND SHINGLE STAIN OILS

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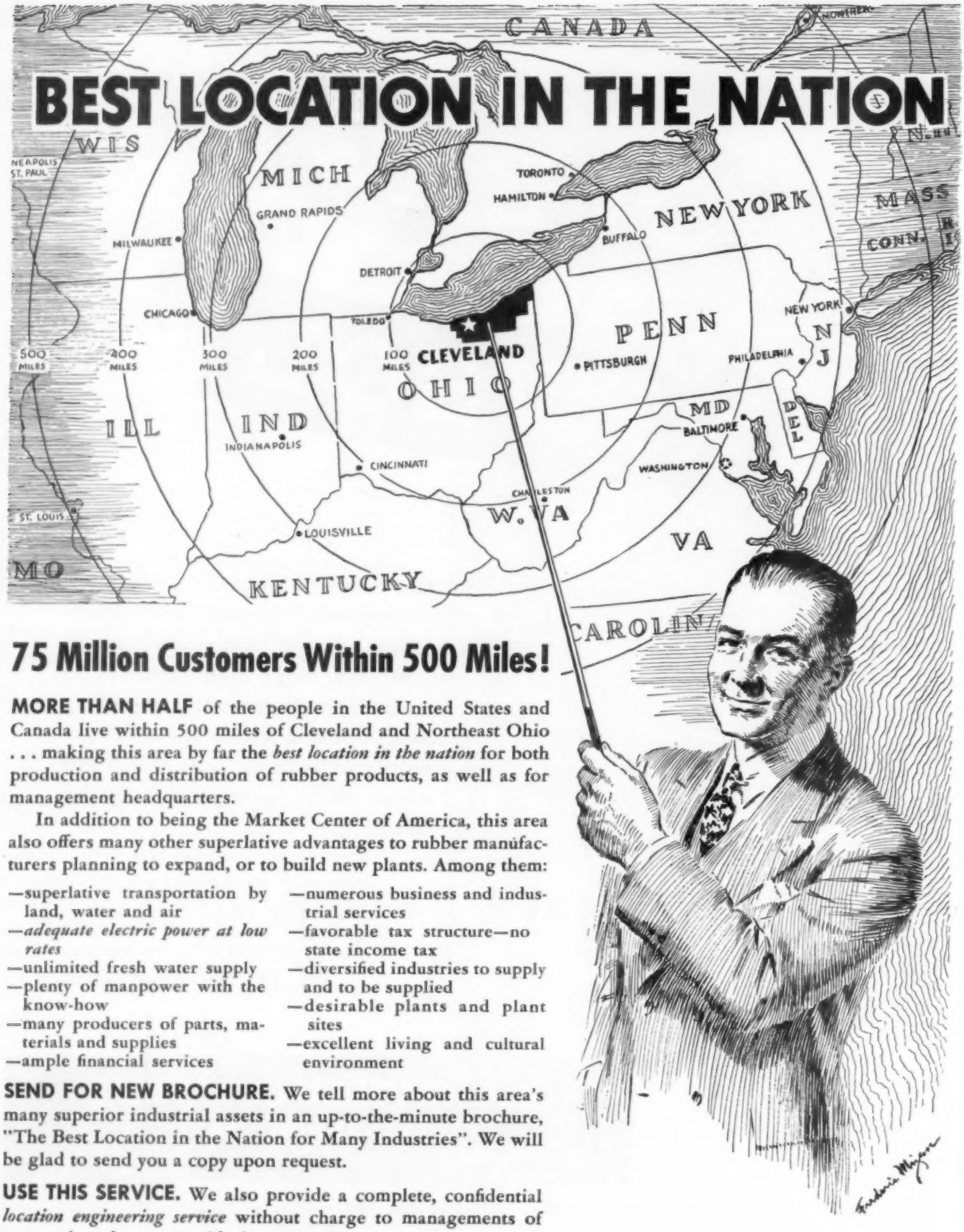

75 Million Customers Within 500 Miles!

MORE THAN HALF of the people in the United States and Canada live within 500 miles of Cleveland and Northeast Ohio . . . making this area by far the *best location in the nation* for both production and distribution of rubber products, as well as for management headquarters.

In addition to being the Market Center of America, this area also offers many other superlative advantages to rubber manufacturers planning to expand, or to build new plants. Among them:

- —superlative transportation by land, water and air
- —*adequate electric power at low rates*
- —unlimited fresh water supply
- —plenty of manpower with the know-how
- —many producers of parts, materials and supplies
- —ample financial services
- —numerous business and industrial services
- —favorable tax structure—no state income tax
- —diversified industries to supply and to be supplied
- —desirable plants and plant sites
- —excellent living and cultural environment

SEND FOR NEW BROCHURE. We tell more about this area's many superior industrial assets in an up-to-the-minute brochure, "The Best Location in the Nation for Many Industries". We will be glad to send you a copy upon request.

USE THIS SERVICE. We also provide a complete, confidential *location engineering service* without charge to managements of companies who are considering expansion.

Call, write or wire Industrial Development Division, R. C. Hienton, Director

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

79 PUBLIC SQUARE • CHERRY 4200 • CLEVELAND 1, OHIO

Formula for more sales appeal!

YOUR PRODUCTS +JOHNSON'S RUBBER FINISHES

Here's new beauty and extra protection for your rubber products—beauty and protection that will step up appearance . . . make your merchandise more attractive to buyers!

It's Johnson's Rubber Finishes, the *wax* finishes that add so much to the good looks of rubber products. They give rubber goods a lustrous beauty that increases "eye" and "buy" appeal. They add wax protection, too . . . against "shopwear" . . . scuffs and scratches . . . dirt and finger marks. They help guard against oxidation and sun checking, destroyers of rubber surfaces and sales.

Easily applied by spraying, dipping or wiping, Johnson's Rubber Finishes can be inexpensively worked into your production set-up. They resist cracking and scaling, are non-flammable, and available in clear or black.

SEND FOR FREE SAMPLE! See for yourself how a Johnson's Rubber Finish improves the appearance of your product. Fill out and mail the coupon today!

These and many other rubber products are made more saleable by Johnson's Rubber Finishes

Door mats · Hot water bottles · Rubber gloves · Refrigerator gaskets · Rubber toys · Soles and heels · Tires · Garden hose Stair treads · Rubber boots, overshoes

JOHNSON'S RUBBER FINISHES

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Made by the makers of Johnson's Wax

(A name everyone knows)

S. C. JOHNSON & SON, INC., Racine, Wisconsin

Hold your War Bonds to hold off inflation!

S. C. JOHNSON & SON, INC.
Dept. RA-85, Product Finishes Dept., Racine, Wis.

Gentlemen: Yes, your Rubber Finishes sound good to me. Send me free sample of
_____ *clear* _____ *black*

Name_____ Title_____

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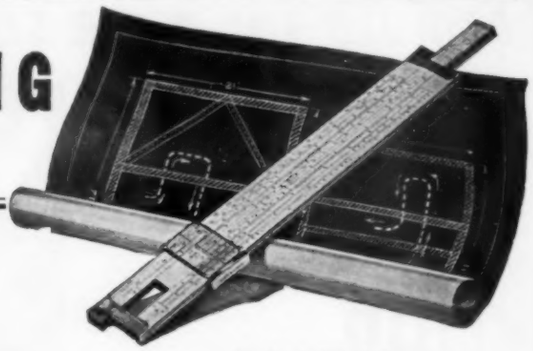
Product_____

OVEN ENGINEERING NEWS



IOE Box Ovens Bring High Speed And Top Efficiency To Both Experimental And Production Work

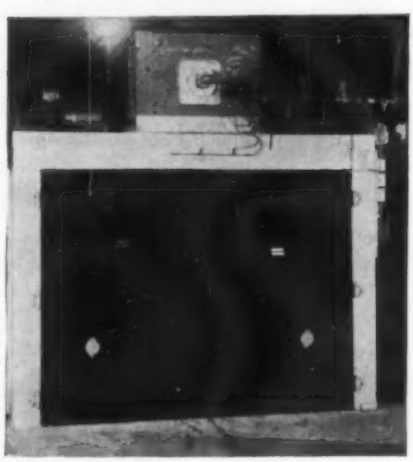
Many rubber and synthetic processing jobs, particularly in laboratories and pilot plants, do not require elaborate handling, conveying and heating equipment, and for such applications the Industrial Oven Engineering Company designs and manufactures a complete line of box-type ovens.

Furnished for any kind of commercial fuel, the ovens shown on this page have given their users considerable advantages of speed, cost and quality in their finished products. While each oven is custom built to assure maximum efficiency for the user's needs, all are made according to standardized designs which result in improved structural qualities.

This low-temperature curing oven for mechanical rubber parts is shipped assembled, ready for operation after attachment of accessories and connection to its heat source. It has a built-in, high-pressure air heater for positive and rapid circulation through a dense work load.

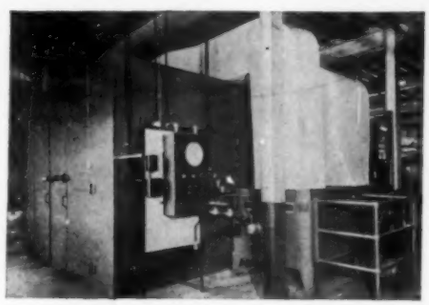
Above: A standard unit for polymerization of laminated synthetic materials, providing temperatures up to 900° for the thermo-setting of flexible organic resins. In one application it reduced polymerizing time for a given load from 18 to 9 hours without temperature increase. However, extra temperature capacity allows high boiling point solvents to be readily processed and high temperature resins to be used as easily as conventional impregnants.

Below: A preheating oven for rubber sheets. This unit handles a total load of 3000 pounds, carried on two trucks weighing 500 pounds each. With such a load on the basis of a short cycle heat, fuel costs average only 14 cents per hour.



Paint Finishes Baked Faster

Tests conducted on regular production runs of paint finishes baked on hard rubber parts show that **IOE** box ovens have cut baking time up to 15 per cent, at the same time producing decidedly superior surfaces. Like every other **IOE** installation, the oven shown below is equipped with a large-volume convection air heater and complete temperature, safety and ignition controls.



SIX IMPORTANT POINTS

1. Standard sizes and designs.
2. Wide temperature ranges.
3. Extra-capacity heating equipment.
4. Heavy, rugged construction.
5. Extreme temperature accuracy.
6. Fool-proof control equipment.

New Data on Fabric Cementing

Write for this reprint of our *Rubber Age* article, "High Speed Handling and Drying in the Cementing of Tire Fabric," describing the operation of a complete tire fabric cementing system. FREE.

(This is No. 20R of a series. Reprints of previous advertisements sent free upon request.)

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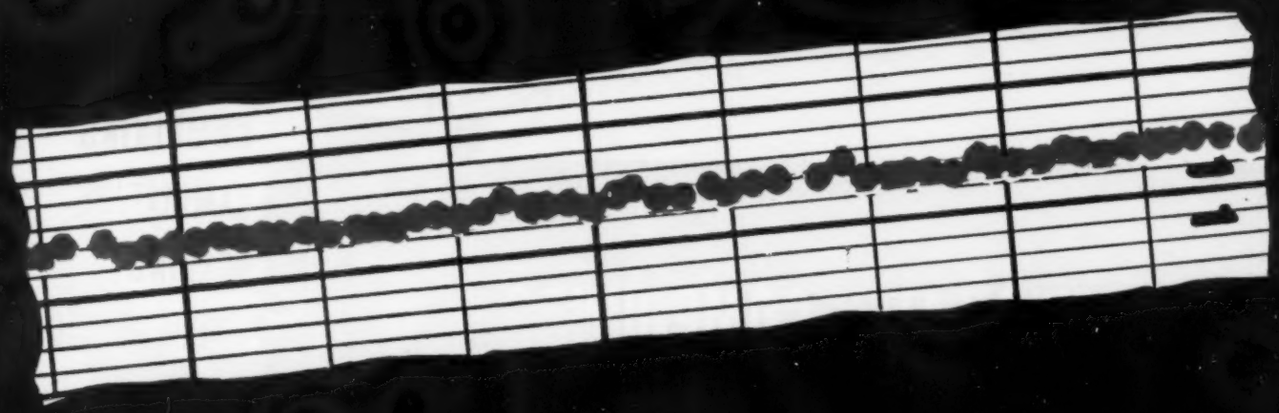
THE INDUSTRIAL *Oven Engineering* COMPANY

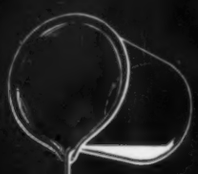
11621 DETROIT AVE., CLEVELAND 2, OHIO

Engineering Representatives in Principal Industrial Areas

● ★ ASSOCIATED COMPANY: JAMES DAY MACHINERY LTD., LONDON, W. 1, ENGLAND ★



Baker's Controlled Temperature* supplies what NEOPRENE COMPOUNDERS demand



a CALCINED MAGNESIA that is always UNIFORM

7 BAKER CHEMICALS for the rubber industry

MAGNESIUM OXIDE
MAGNESIUM CARBONATE
CALCIUM NITRATE
LEAD ACETATE
LEAD PEROXIDE
CARBON DISULFIDE
CARBON TETRACHLORIDE

NOTE THE temperature chart above! The temperature recording of the electric ovens never varies more than 5%. Temperature control and uniform physical characteristics—both are important factors in supplying light Calcined Magnesia of satisfactory quality to Neoprene Compounders.

Baker's Magnesium Oxide (Neoprene grade) is easy to incorporate. It is uniformly good in wetting power and dispersion. It provides improved stability of the compounded stock.

These are qualities Neoprene Compounders *must* have in a Calcined Magnesia. They are qualities you *get* in Baker's Light Calcined Magnesia. Baker, in many years of producing purity products to definite physical and chemical specifications, has learned the art of *exactness* and of manufacturing to small tolerances.

Investigate Baker's Light Calcined Magnesia. Learn why it is better. Send for free samples.

J. T. Baker Chemical Co., *Executive Offices and Plant:* Phillipsburg, New Jersey. *Branch Offices:* New York, Philadelphia and Chicago.

Baker's Light CALCINED MAGNESIA

(MAGNESIUM OXIDE)

SYNTHETIC LATEX COMPOUNDS

for

COMBINING
LAMINATING
FOLDING
IMPREGNATION
COATING
GENERAL
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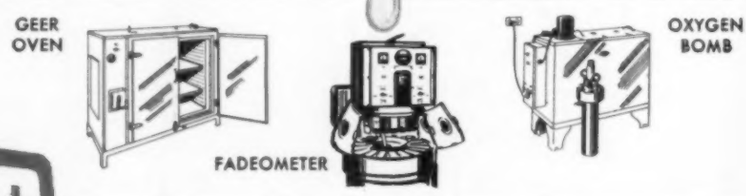
- √ drying time
- √ flexibility
- √ film strength

- √ Buna
- √ Neoprene
- √ Other Synthetic Bases

The UBS Laboratories are only one of many American industrial research groups busy with synthetic latex compounding problems. But we *have* made some valuable contributions to the general fund of knowledge in this important field, *including the development of several original bases.* And we're constantly conducting tests to improve ageing qualities for particular applications, *employing the testing methods best suited to the application for which the compound is to be used.* For experience has taught us that no single Testing Method is valid for all synthetic latex applications. The Oxygen Bomb will often show things, for instance, that a Fadeometer can not possibly show. That's why we keep all three Testing Methods in operation at the UBS Laboratories—*Geer Oven, Oxygen Bomb and Fadeometer.* And that's one more reason why we think you will find UBS a good source of supply for Synthetic Latex Compounds. *Write today, describing your problem in detail.*



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facts bear repetition

These facts bear repeating: RESINEX improves tensile, elongation, resistance to abrasion and cut-growth; its softening action speeds milling and smooths out stocks for better extrusion. These facts have been established through actual production and testing experience on a wide variety of materials . . . The significance of these improvements in physical properties of compounds required for many purposes—in mechanicals, for instance, or soles and heels—is emphasized today by the growing demand for better quality.

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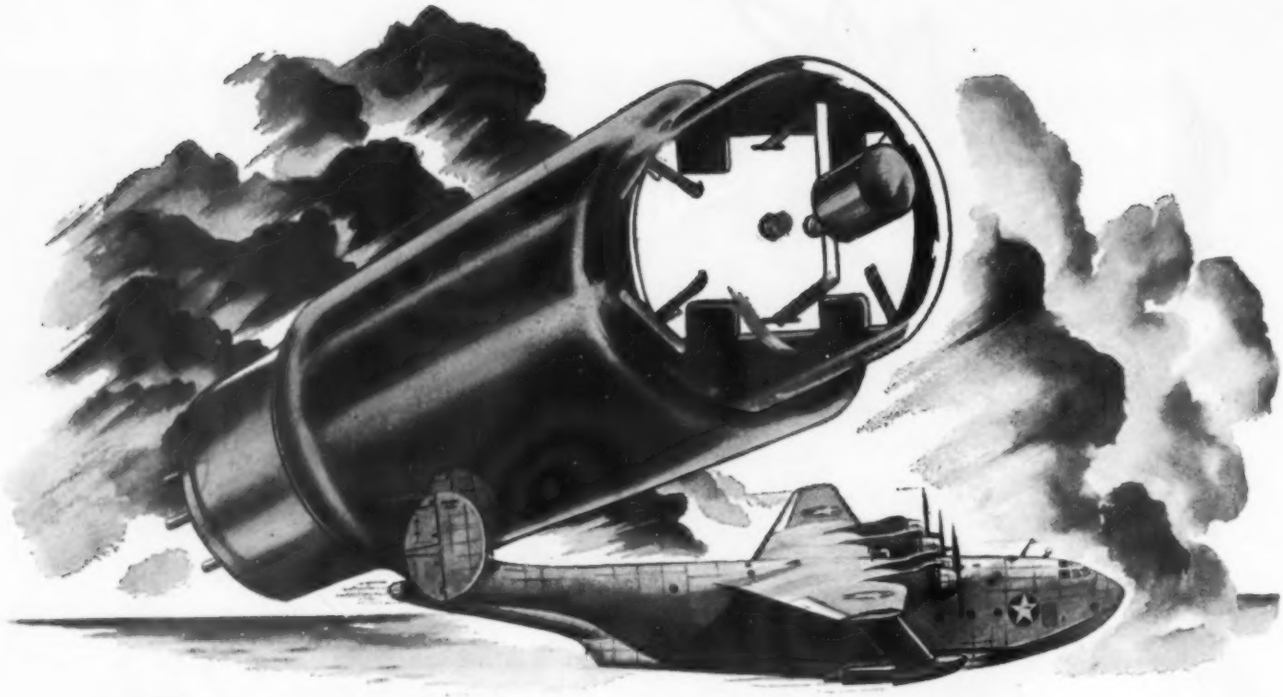

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Whittaker is one of the world's largest suppliers of talcs—most of which are still available. For exactly the talc you want, for best possible deliveries, or for consultation on talc problems, you'll find it pays to try Whittaker—*first*.

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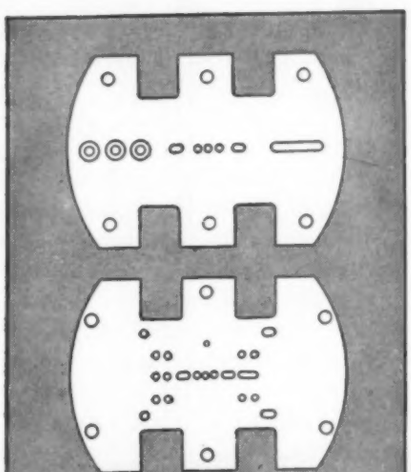

Illustrated are typical talc insulators, used in electronic tubes, cut from India block talc and then fired. The same India talc is a peacetime ingredient in finer cosmetics.

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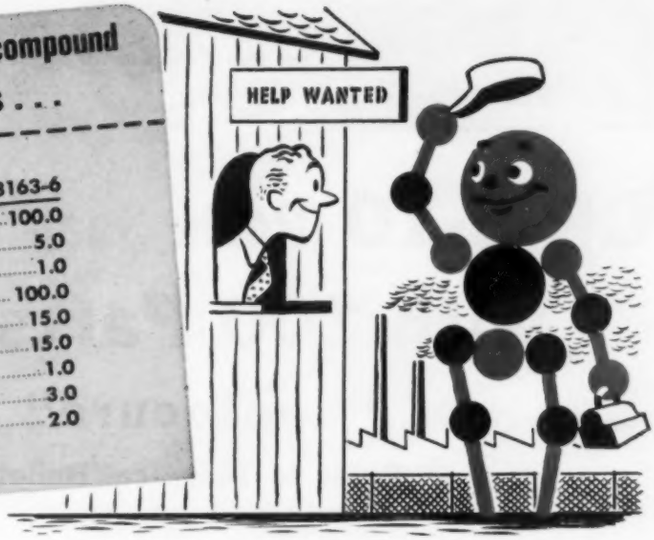
Stearic Acid	1.0
Medium Thermal Black	100.0
Plasticizer S.C.*	15.0
Tributoxyethyl phosphate	15.0
Mercapto benzothiazole	1.0
Tetramethyl thiuram disulfide	3.0
Protective Wax**	2.0

*Diisobutyl azelate may be used.
**Sunproof, Heliozone, Antisol.



	SHORE HARDNESS	TENSILE P.S.I.	ELONGATION AT BREAK PER CENT	LOAD P.S.I. AT 300% ELONGATION	VOLUME INCREASE	WEIGHT LOSS PER CENT
Original physical properties	37	1160	1000	240	. . .	. .
Oven aging 70 hrs. @ 212°F.	40	1250	940	. . .	. . .	1.8
Immersion in A.S.T.M. Test Oil No. 3 70 hrs. @ 212°F.	35	1190	900	. . .	2.1	
Immersion in 40% Aromatic Test Fluid SR-6 at Room Temperature 168 hrs.	18	515	660	. . .	38.0	
Immersion in Gasoline Test Fluid SR-10 at Room Temperature 168 hrs.	35	925	1000	. . .	2.2	. .

Compression Set A.S.T.M. Method B 70 hrs. @ 212°F.		31. per cent
Rebound (Goodyear—Healy)	@ 104°F.	54. per cent
	@ 212°F.	59. per cent
Tear Test (ASTM D624-41T) Room Temperature		180 pounds per inch
Low Temperature Brittleness Test D736-43T		O.K. at −70°F. Failed at −75°F.

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Technical Bulletin No. 13 — on the Compounding of GR-S with Substantial Loadings of Zinc Oxide

GR-S-10 (Rosin Soap Polymer) Compound with 100 Parts of Zinc Oxide

"Santocure" Acceleration

(Refer to Technical Bulletins Nos. 9, 10 and 11)

WITH standard GR-S, high tensile properties with 100 part loadings of Zinc Oxide, accelerated with "Santocure," were obtainable only with difficulty. However, GR-S-10 (the rosin soap polymer) with this acceleration gives very good results with respect to stress-strain, tear resistance, pendulum rebound and heat generation.

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GR-S-10	100.0
Sulfur	2.0
"Santocure"	2.0
ELC Magnesia	5.0
Coumarone-indene Resin	3.0
Zinc Oxide	100.0

ORIGINAL RESULTS

Time of Cure Min. at 45 Lb.	Tensile Strength (psi)	Per Cent Elongation	Modulus Load (psi) for Elongation of				Permanent Set
			200%	300%	400%	500%	
15	(no cure)	—	—	—	—	—	—
20	1735	695	225	300	450	680	.17
30	1810	650	225	340	490	795	.18
45	1485	605	230	305	495	800	.11
60	1385	590	230	345	540	770	.07
90	1880	680	225	300	450	680	.12

Time of Cure Min. at 45 Lb.	Shore Hardness	Goodyear-Healey Pendulum		Compression Fatigue (Goodrich Flexometer)*					Cut-Growth Resistance Inches—Failure at	
		Indentation in mm.	Per Cent Rebound	Per Cent Initial Comp.	Running Time and Per Cent Permanent Set	Max. Temp. Rise °C.	Dynamic Compression		15,000 Cyc.	48,000 Cyc.
							Initial	Final		
90	44	8.51	64.4	25.1	15'— 2.3	14.5	16.4	18.3	.31	—

*Test Conditions: 100 Lb. Load. 0.15" Stroke. 100°C. Oven Temp.

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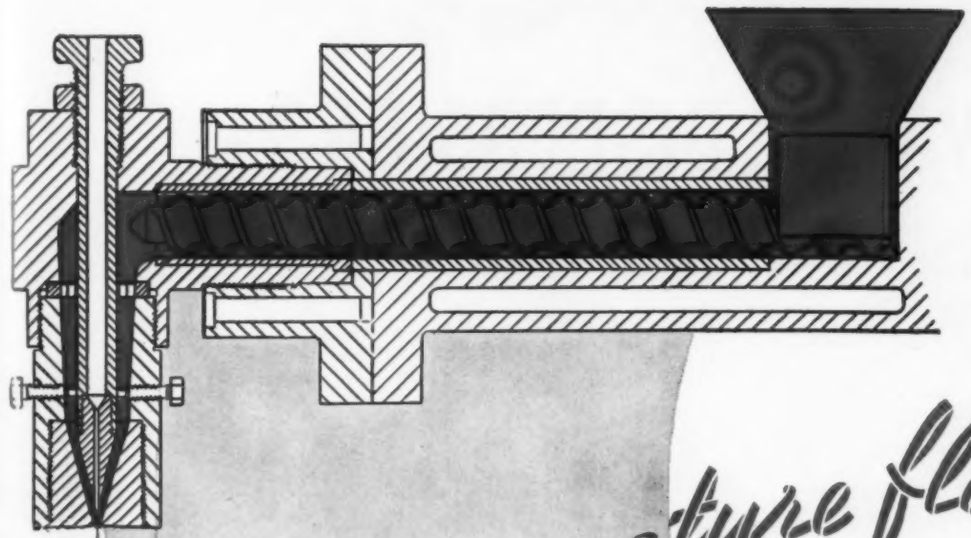

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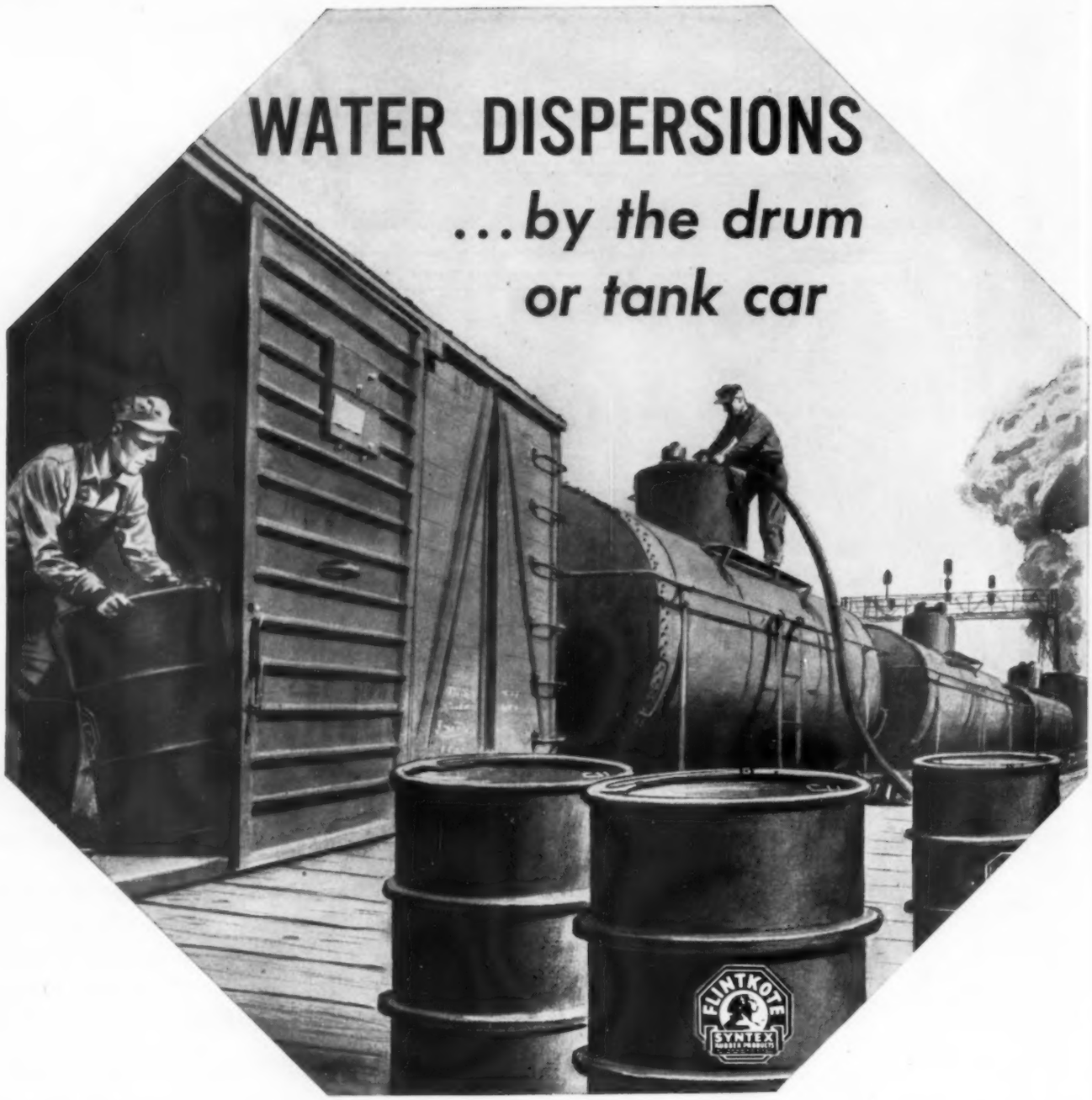

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You can use ortho-nitrobiphenyl as a plasticizer, alone or in conjunction with other plasticizers. It is applicable to the entire range of synthetic resins from the cellulose esters and ethers through the vinyls and vinyl copolymers. It is compatible with alkyds and some synthetic rubbers.

We shall be pleased to send complete data and samples for your experimentation. You may make your request on the convenient coupon, by contacting the nearest Monsanto office or by writing: MONSANTO CHEMICAL COMPANY, Rubber Service Department, Second National Building, Akron 8, Ohio. District Offices: New York, Chicago, Boston, Detroit, Charlotte, Birmingham, Los Angeles, San Francisco, Seattle, Montreal, Toronto.

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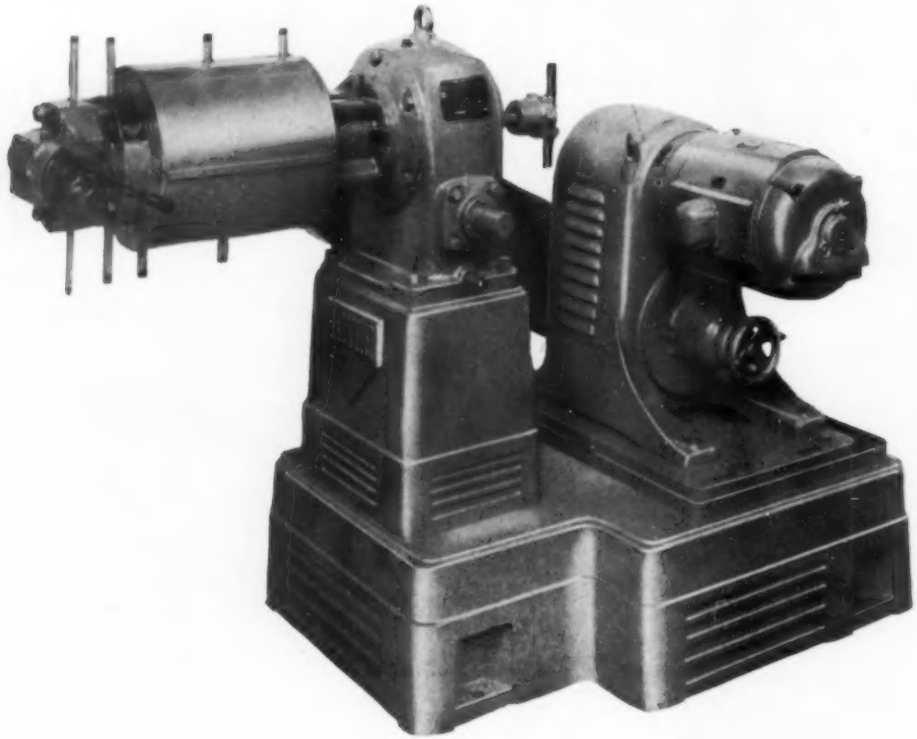
The figures included are approximately correct and can be considered as average values for ortho-nitrobiphenyl, technical.

	Grade A	*Grade B*
COLOR AND APPEARANCE	Light greenish yellow crystalline solid or oily liquid.	Light to dark reddish brown crystalline solid or oily liquid.
MELTING POINT		35°C.
BOILING POINT AT 760 MM.		320–330°C.
REFRACTIVE INDEX AT 25°C.		1.613
SPECIFIC GRAVITY AT 40°/15.5°C.		1.189
SPECIFIC GRAVITY TEMPERATURE COEFFICIENT		0.00083/°C. (33°–80°C.)
VISCOSITY AT 25°C. AT 45°C.		38 Centipoises 12 Centipoises
FLASH POINT		143°C. (289.5°F.)
FIRE POINT		179°C. (354.5°F.)

SOLUBILITY: Ortho-Nitrobiphenyl is readily soluble in most organic solvents but is practically insoluble in water, either hot or cold. Some of the materials in which Ortho-Nitrobiphenyl will dissolve are:

Benzene	Ethyl Acetate	Mineral Spirits
Ethyl Alcohol	Amyl Acetate	Pine Oil
Methyl Alcohol	Ortho-Dichloro-benzene	Turpentine
Ether	Carbon Tetrachloride	Linseed Oil
Acetone	Glacial Acetic Acid	Soyabean Oil
Methyl Ethyl Ketone		Corn Oil



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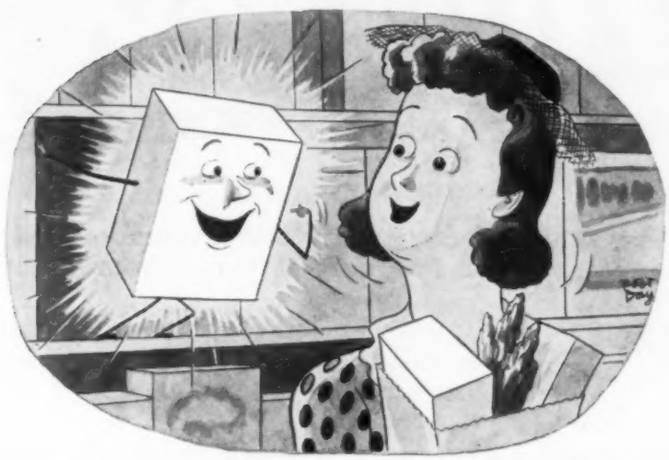

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The compounding characteristics of these clays are quite different. The table below illustrates the effect of sulfur dosage in a compound with 150 parts of clay on 100 parts of GR-S. Note the reverse behavior of the two clays.

	SUPREX		HYDRATEX-R	
Sulfur	3.0	1.5	3.0	1.5
Tensile	2000	1750	1450	1630
Stress—300%	840	700	780	560
Elongation	510%	600%	470%	640%

SUPREX produces maximum reenforcement at high sulfur levels — HYDRATEX-R at low sulfur levels. Further information available upon request.

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RUBBER AGE

VOL. 57, No. 4 AUGUST, 1945

Application of Statistical Methods to the Production of Synthetic Rubber

By G. R. VILA and M. D. GROSS

Synthetic Rubber Division, U. S. Rubber Co., Naugatuck, Conn.

THE utilization of statistical methods for controlling mass production operations is a rapidly expanding science. In all processes where strict control is essential, where a wide variety of factors can affect the product, where large masses of data must be condensed and useful information extracted—the statistical method is proving an invaluable and indispensable tool.

In the production of GR-S, huge quantities of raw materials are converted by successive stages into an end product which must be uniform. The amount of data handled is enormous—all raw materials must be tested, solutions must be analyzed, polymerization must be watched and carefully controlled, the finished product must be subjected to a great variety of tests—these are only a few of the many steps which must be controlled if a uniform product is to be obtained.

It has been found that the application of statistical concepts has made possible the fullest utilization of the data which is continuously being accumulated. The present article describes the manner in which this has been accomplished, and gives some indication of the principles involved.

Note: This article is based on a paper delivered by Mr. Vila before the Society for Statistical Quality Control, at Newark, N. J., on May 25, 1945.

Description of Process

Fig. 1 represents in perspective form a simplified flow sheet covering the production of GR-S. The various steps in the process which are amenable to control are indicated on the drawing. The salient features of the process and its concomitant control may be summarized as shown in Table I. More detail on the process and equipment may be found in the literature *(1, 2, 3, 4, 5)*.

Table I in conjunction with Fig. 1 will suffice to exemplify the multitude of steps in the process and the character of the control which must be maintained. The primary objective of process control, of course, is maximum quality and uniformity in the finished product consistent with the most efficient use of manpower and materials. Experience over the past several years has demonstrated the necessity for strict control of the items listed in order to achieve the objective of high quality, uniformity, and economy.

Testing

It is axiomatic that test data are only so good as the inherent precision of the testing methods used. It is clear, therefore, that the accumulation of pertinent data must be based on accurate testing. To this end an

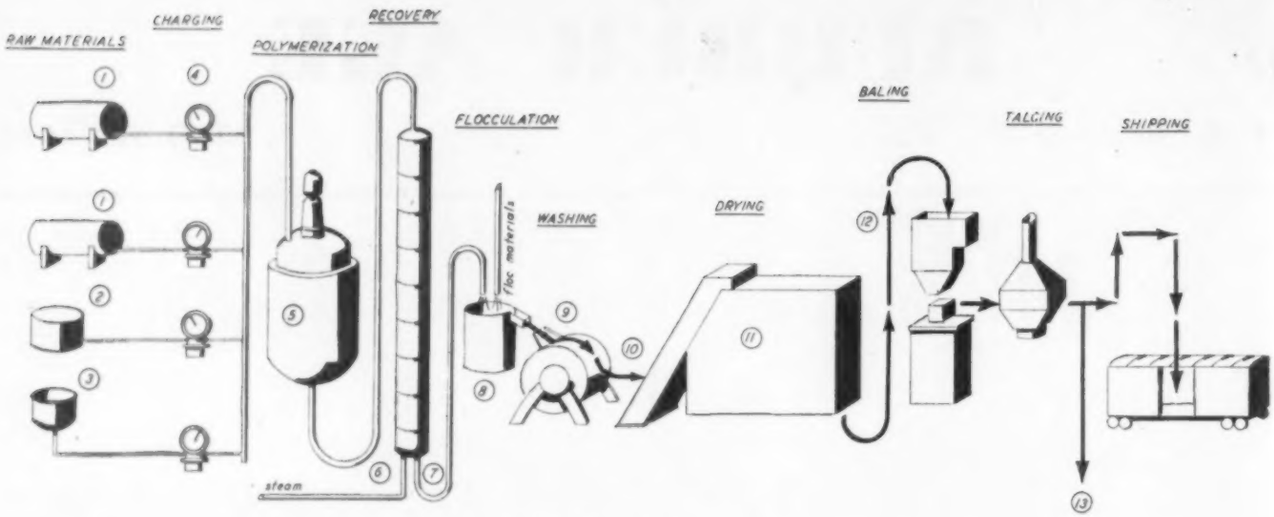

FIG. 1—Steps in Process.

Items which must be controlled are: (1) Purity of hydrocarbons; (2) Hardness of water; (3) Activity of catalysts; (4) Calibration of charging meters; (5) Time, temperature, yield and viscosity of polymerization batch; (6) Steam flow; (7) Residual unstripped hydrocarbons; (8) Quantity and concentration of materials; (9) Volume of wash water, hardness of water, filter pressure; (10) Ash content; (11) Temperature of dryer; (12) Moisture content; (13) Physical and chemical tests.

effective program of over-all control must give attention to controlling the basic testing technique as well as the process per se.

The physical testing of vulcanized rubber compounds is notoriously subject to wide variations. The characteristic lack of precision is further aggravated by systematic errors often found in physical testing laboratories. In order to minimize variations, it has been found desirable to carry on a constant cross-testing program between different laboratories attached to GR-S plants operating under the same management or within the industry as a whole.

Such programs have taken the form of daily physical and chemical testing of GR-S from the same lot with referee testing by a central laboratory. Examination of results shows where laboratories deviate from one another. Further and more detailed auxiliary cross-testing is frequently required to determine the cause of systematic errors in testing before corrective action can be applied.

TABLE I—SUMMARY OF THE SALIENT FEATURES OF THE GR-S PROCESS AND ITS CONCOMITANT CONTROL

Operation	*Points of Control*	*Method of Control*
I. Raw Materials Preparation	(1) Purity of raw materials (2) Concentration of solution	Analysis of sample Analysis of sample
II. Reactor charging	Charging meters	Daily calibration
III. Polymerization	(1) Temperature (2) Time (3) Yield (4) Viscosity	Instrumentation Reaction cycle Solids content of sample Mooney vis. of flocculated sample
IV. Recovery of unreacted hydrocarbons	(1) Vacuum (2) Steam flow (3) Hold-up time (4) Residual unstripped hydrocarbons	Instrumentation Instrumentation Material flow rate Analysis of stripped sample
V. Flocculation	(1) Composition of brine (2) Quantity of brine (3) pH of acid (4) Temperature (5) Hold-up time (6) Porosity and size of crumb	Analysis of sample Instrumentation Instrumentation Instrumentation Material flow rate Visual inspection
VI. Washing	(1) Hardness of wash water (2) Quantity of wash water (3) pH of wash water (4) Hold-up time	Analysis of sample Valve setting Analysis of sample Material flow
VII. Drying	(1) Temperature (2) Time	Instrumentation Machine setting
VIII. Baling & Packaging	(1) Weight (2) Talc to prevent adhesion to package	Automatic weigh scales Visual inspection
IX. Testing of Finished Product	(1) Viscosity (Plasticity) (2) Chemical properties (3) Stress-strain characteristics	Mooney viscometer Analysis of sample Rubber testing

Handling Large Masses of Data

It is evident from the above exposition that tremendous masses of data are accumulated which would be worthless unless recorded and correlated to reveal pertinent facts. This can be done most effectively by the application of certain statistical methods to be described.

Statistical information so developed may be used either dynamically for immediate control of current operations or historically for longer range development of more efficient modes of operation or for achieving desired quality effects. In either event the crux of the problem is to organize data in such a manner that significant trends or correlations are clearly indicated. Variations which are normal must be clearly segregated from variations which are abnormal and hence originate from some phase of the process or equipment which has undergone significant change.

Frequency Distributions and the Standard Deviation

In making successive measurements of any particular variable normally encountered in manufacturing processes, such as Mooney viscosity or modulus, in the case of GR-S, the values obtained are never found to be identical, even under the most favorable conditions. They are always found to vary to a

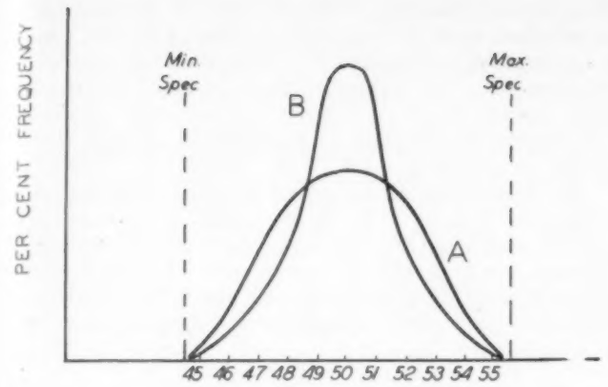

FIG. 2—Distribution of Mooney viscosity for two months.

greater or lesser extent, although an examination of the data will show that most of the values are fairly close together, with very few extremes. To describe such data compactly, a very common statistic—the arithmetic mean, or more simply the average or mean —is employed. The use of the average is so widespread, and its importance so well known, that it need hardly be described here. Yet the average conveys only a limited amount of information; it gives no hint of the "spread" or dispersion of the values about the average. Often the range is used for this purpose, but since the range depends on only the two extreme values, it is at best a very loose and often a very misleading description.

To adequately describe situations of this nature, the frequency distribution has been found of outstanding value. A frequency distribution is obtained by dividing the data into suitable groups or classes, and determining the number of items, or the per cent of items, in each group. Graphically, such a distribution may be represented as a frequency distribution curve.

Two such curves, describing the distribution of Mooney viscosity in one plant for two different months, are shown in Fig. 2. These curves indicate at once not only the average and range, but also shape of the distribution. It should be noted that production for both months has the same average Mooney viscosity and also the identical range, yet the uniformity of the product is very much better for Month B than for Month A. Two-thirds of the production in Month B tests between 49 to 51 Mooney viscosity, while only about one-third of production in Month A falls within that range. All production, however, falls within the specification limits.

The frequency distribution thus describes not only the average and range of a set of values, but also the uniformity of the values (the closeness with which they cluster about the mean) and the relative number of items between any arbitrary limits of values.

The usefulness of this concept may be further increased by employing another statistic called the standard deviation. This is a numerical value which describes the uniformity of a distribution without the necessity of plotting a curve, though it in no way diminishes the usefulness of the curves. It can be calculated in the manner illustrated in Table II.

The standard deviation, usually designated by the Greek letter σ (sigma), becomes smaller as the uniformity of the values increases; if all the values in Table II were 48, for example, σ would be equal to zero. Hence the magnitude of the standard deviation provides a numerical basis of comparison of various distributions. The relation of the standard deviation to the shape of the distribution curve is illustrated in Fig. 3 which demonstrates that the same standard deviation may apply to two frequency distributions which have different average values; conversely two frequency distributions may have identical averages with different standard deviations.

The concept of the standard deviation is by no means limited to the description of the uniformity of distributions. It has very much greater importance in the far reaching applications to which it can be put in control charts, variance analysis, and correlation, which will be described in some detail.

TABLE II—CALCULATION OF THE STANDARD DEVIATION*

Mooney Viscosity Values	*Average*	*Deviation from Average*	*Deviation Squared*
46	48	−2	4
47	48	−1	1
47	48	−1	1
49	48	+1	1
48	48	0	0
50	48	+2	4
49	48	+1	1
Average 48			1.7

Standard Deviation = square root of average of sum of squares = $\sqrt{1.7} = 1.3$

* The actual numerical values used in this table and in any of the figures included in this article are not to be considered representative of either actual performance or actual specifications for GR-S. They are used for illustrative purposes only.

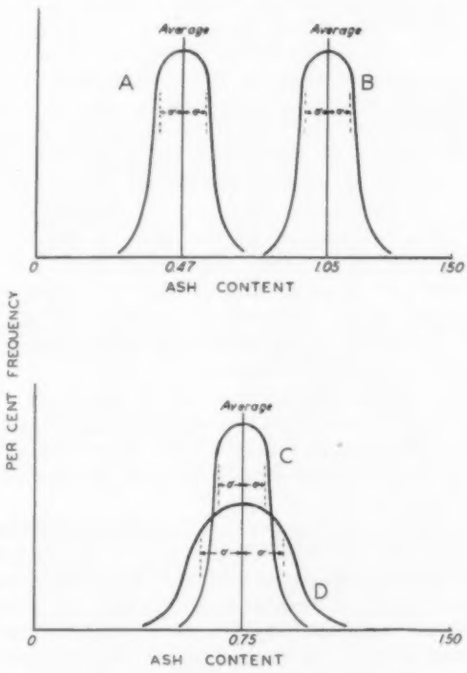

FIG. 3.

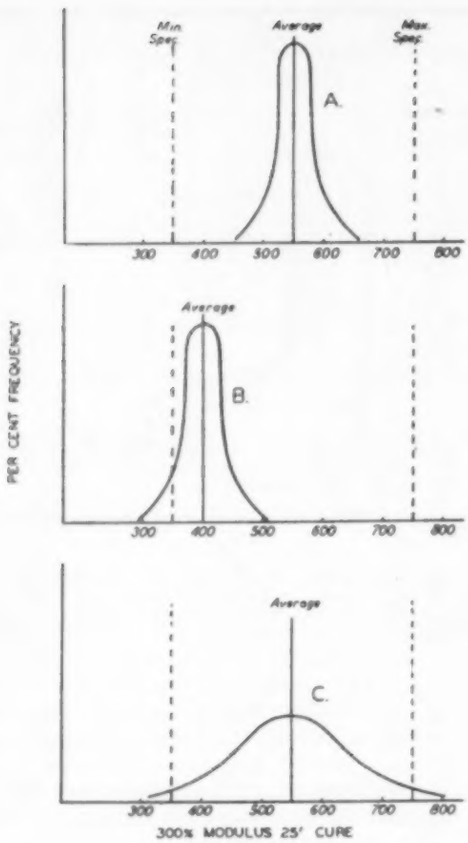

FIG. 4.

The relation of product quality to specification limits is a constant concern to the producer of any commodity. In the production of GR-S, this relation is of special interest because of the multitude of factors which may affect product quality. The illustrations in Fig. 4 show how distribution curves eminently serve this interest. In Curve A for 300% Modulus 25' cure, it is apparent that all tests fall well within the specification limits, and that the curve is symmetrical with respect to these limits. It is also apparent that should the specifications be narrowed from 350-750 to 450-650, practically all production would still be in specification. If they were changed to 400-600, approximately 10% (as judged by the area of the curve cut off at 600) would be above specification.

In Curve B, approximately 10% of production is below specification. It becomes obvious that all values must be increased by about 50 psi. if production is to be entirely within specification.

Curve C illustrates a hypothetical condition of poor uniformity, with material testing both higher and lower than the specification limits. The only remedy in this case is to improve the process so that a more uniform product results.

Most distribution curves of factory processes tend to approach the "normal curve" fairly closely: that is, they are reasonably symmetrical, and contain but one hump or mode. In cases in which lack of symmetry is evident, the explanation usually lies in the use of an insufficient number of items to describe a smooth curve. By increasing the number of values to about 400, a smooth, symmetrical curve is almost always obtained. Occasionally, however, a two-humped or bimodal curve is obtained even with a large number of values. Such a curve inevitably points to the inclusion of two levels of operation. For example, if two Mooney viscometers were used during a period of time, and if one were testing several points low, a bimodal distribution curve would be obtained.

An illustration of an actual bimodal distribution is shown in Fig. 5. The curve is based on over 2500 points, and describes the reaction time of individual batches for a period of one month. The two modes are the result of a change in the purity of certain raw materials used which affected the polymerization reaction rate *(6)*.

Control Charts

Frequency distribution curves serve their most useful function in the presentation of accumulated, historical data in a complete, compact and comprehensible manner. If the interest lies, however, in current, up-to-date information, if the emphasis is day-to-day control rather than the analysis of past data, then the distribution curve loses its value because of the time lag required for its preparation and its inadequacy in neglecting sequence.

If the values that make up a frequency distribution were plotted in the sequence in which they were measured, the resulting graph would retain most of the advantages of a distribution curve, and in addition have the features of greater flexibility and usefulness. As the result of each successive measurement became known, it could be added on to the chart in a continuous process.

The evolution of the control chart from the frequency distribution curve may be seen in Fig. 6. If the points are imagined as beads strung on wires, then by sliding all the beads to one side the contour of the distribution curve is formed. The essential functional difference between the two lies in the fact

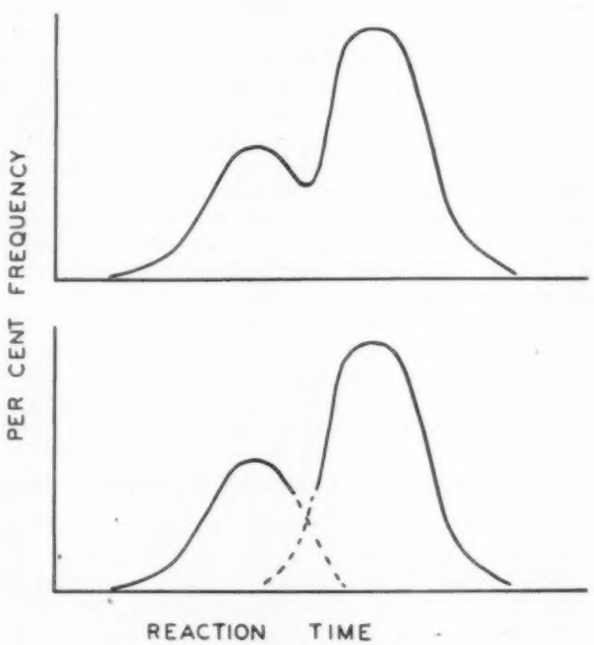

FIG. 5—Bimodal distribution.

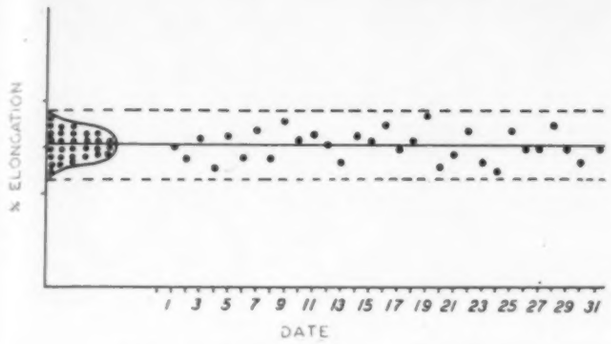

FIG. 6—Relation of control charts to distribution curve.

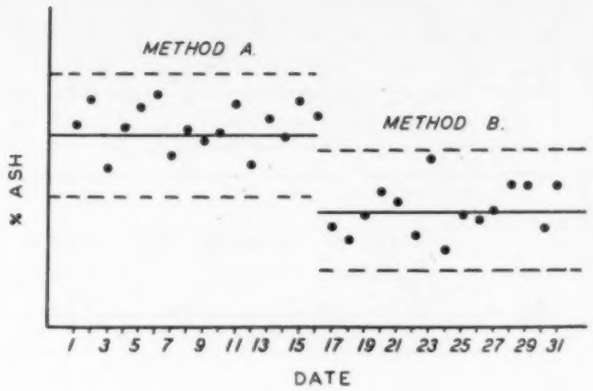

FIG. 8

that the control chart shows chronological sequence while the distribution curve does not.

The usual form of the control chart consists of a solid horizontal line corresponding to the average values currently obtained, and two dotted lines, one above and one below the average line. The distance from the central average line to the dotted lines, which are usually called action lines or control limits, is equal to the distance from the center of the distribution curve to either end. (Theoretically, the curve extends in both directions to zero or infinity, but the area is so small that it can be neglected for practical purposes.) It is interesting to note that the distance from the average to the end of the curve is equal to just three times the standard deviation (sigma); hence the control limits are often referred to as 3-sigma limits.

The function of the control chart is to define the limits which may be ascribed to normal variation for a given process. These limits are not arbitrary limits, nor specification limits, but rather statistical limits based, as shown, on the normal frequency distribution. Any variation within these limits is normal; that is, it can arise by chance or random factors alone. Variations beyond these limits are not normal; that is, it is highly improbable that they are a result of merely chance or random factors. Thus a definite cause should be ascertained.

In setting up the control chart, the standard deviation of past data is computed, and the chart constructed using the average as a center line and three times the standard deviation to establish the control limits. Points are then plotted immediately as the information becomes available. If a point lies between the control limits, then the process is considered to be "in control." If a point falls outside the control limits, then the process is "out of control." Immediate investigation and correction of the difficulty then becomes mandatory.

Fig. 7 is a control chart of the soap content of finished GR-S, measured once per day for one month. For the most part the process is seen to be in control. On the 10th of the month, however, a high value was recorded. Investigation showed that the brine purification system was at fault, allowing hard brine to enter the flocculating system and thus causing high soap content of the GR-S. The same situation was also found on the 18th. Corrective measures were taken to prevent repetition of this condition.

The control chart not only shows the state of control of a given process, but also, by the width of the limit lines, the variability to be expected; it shows the level of operation with reference to specification limits, trends, cyclic variability, and changes in level associated with changes in process.

In Fig. 8 the ash content of GR-S is plotted daily for one month. On the 17th of the month, a change was made in the method of flocculation. It is appar-

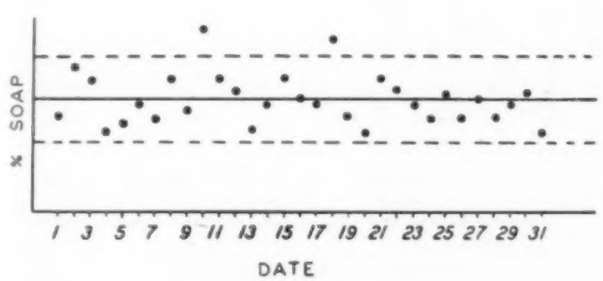

FIG. 7.

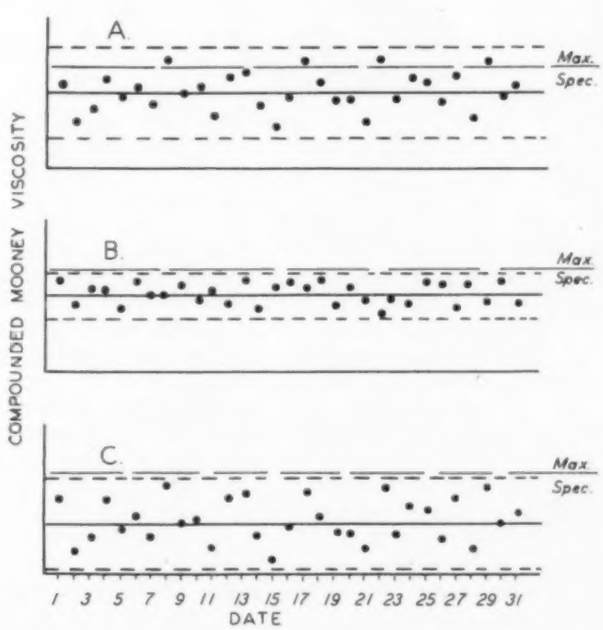

FIG. 9.

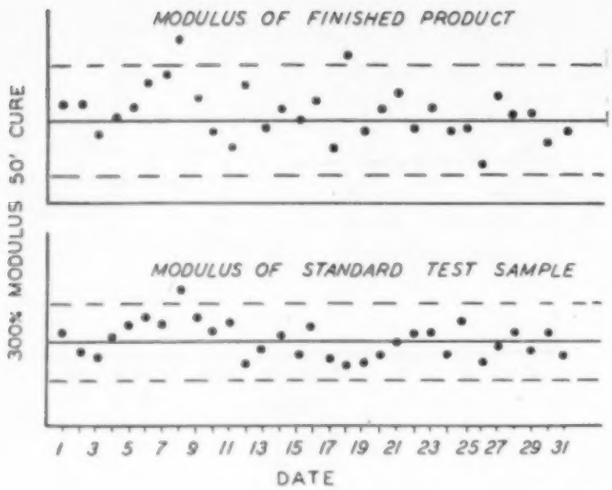

FIG. 10.

ent that the ash content was lowered by this change. It is also worth noting that this conclusion could have been reached only a few days after the change was made.

Just as it is imperative to investigate points which are out of control, so it is also important not to investigate points which are not out of control. An example is demonstrated in Fig. 9, Chart A. In this situation, the upper specification limit lies between the control limits. It should be noted that four points fall outside the specification limits but inside the control limits. It is futile, in this case, to investigate the four points out of specification, for they are due to purely random variation. The investigation should be directed, on the contrary, to the whole process, which is obviously not in harmony with the specification.

One method of attack is to increase the uniformity of the process so that the specification limit lies outside the control limit. This situation is illustrated in Chart B of Fig. 9. Another solution, shown in Chart C, is to modify the process so that the entire level of operation is lowered. Here again, the specification limit now lies outside the control limit.

Daily evaluation of laboratory testing technique has proved to be one of the most profitable applications for the control chart system. As mentioned previously, rubber testing has never reached the refinement and precision possible for the more common types of measurement. Hence, part of the apparent variability in finished product may be due to testing variability, and it is essential that proper control be exercised on all testing. The control chart lends itself to this purpose ideally, for it points out at once the level of testing, the uniformity of results, and any drifts or trends which may creep into the laboratory.

In Fig. 10 are shown two charts of 300% modulus. In the upper chart are daily results on GR-S production, while in the lower chart results obtained on a standard test sample are plotted. It is evident that apparent trends in modulus of the GR-S production are often reflections of trends in testing. The point out of control on the 8th of the month for GR-S production is, in fact, quite obviously a result of faulty testing, which also appears out of control. On the 18th, however, the modulus of GR-S production is again out of control, while testing is not. Here the cause might be sought in the process rather than in the testing technique.

Virtually all of the items listed under "Points out of Control" in Table I lend themselves, if desired, to control chart plotting. For items which vary but little from day to day, the frequency of sampling might logically be reduced. It is probably fair to say, however, that any sample which is worth analyzing is worth recording in control chart form in order to apply the most sensitive judgment to variation which will inevitably occur *(7, 8)*.

Variance Analysis

The concept of the frequency distribution and the standard deviation has been extended to other applications, among which perhaps the simplest is variance analysis. The term "variance" actually refers to the square of the standard deviation, and hence represents a familiar concept.

A common problem that arises in the production of GR-S involves an estimate of the significance of differences between various processes, test methods, or types of GR-S. If, for example, one day's production using an additional leaching operation has an ash content of 0.87, and the next day's production, without the added operation, has an ash content of 1.00, it is not possible to say whether the leaching has been of any value, for the difference in ash contents is small compared to the normal variability in ash content. If the figures mentioned, however, were both averages of ten days' production, it would be possible to determine the significance of the difference by statistical methods. For this purpose the standard deviation of the ten results must be computed for both runs. By substituting in a simple formula the averages and standard deviations found, together with the number of results which were averaged, the significance of the difference may be readily ascertained.

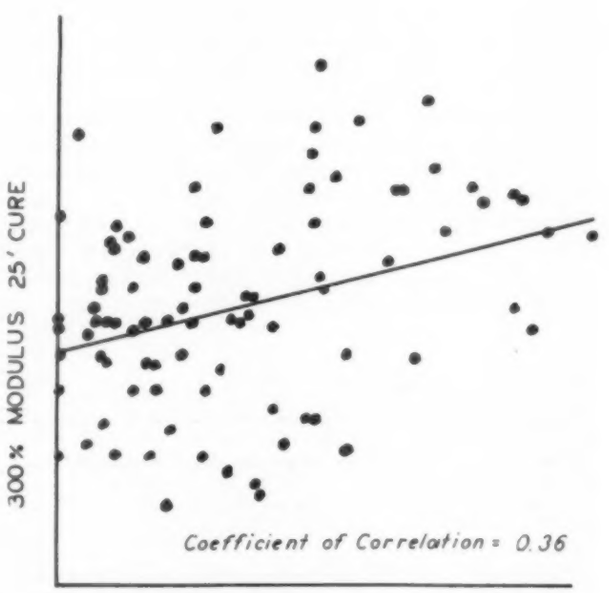

FIG. 11—Per cent gel vs 300% modulus.

A similar problem is common in the interpretation of results of cross-test programs. One laboratory, for example, may obtain an average tensile of 3020 psi. on a standard test sample. A second laboratory may obtain an average of 2990, and a third 3040. Are these values substantially the same, or are they significantly different? Again recourse must be made to the standard deviations for each laboratory, which, when used in conjunction with the average values, provide a means of interpreting the data accurately.

Often there is some interest in determining the significance of difference in uniformity of operations or test methods. A frequently occurring problem arises in the use of different types of instrumentation for polymerization vessels. Two vessels with different instrumentation may produce batches with the same average yield, for example. Yet for 200 batches in each vessel the standard deviation of the yield may be 2.0 in one case and 1.7 in another. The question as to whether one vessel produces more uniform results than the other is answered by simply squaring the ratio of the two standard deviations and interpreting the result by reference to tables. In this particular case, the difference is definitely found to be significant, with the conclusion that one type of instrumentation is superior to another *(9)*.

Correlation

One of the most effective statistical tools developed for the handling of large masses of data is correlation analysis. Treatment of data by this technique affords a powerful method of discovering unobvious and often unsuspected relationships between variables in the manufacturing process and in the finished product. It has been put to excellent use in the production of GR-S.

Correlation analysis measures the closeness of the relationship between variables. It is known, for example, that modulus affects the ultimate elongation at a given cure—the higher the modulus, the lower the elongation. But while this statement is true in general, it may not be true in every case tested, due to testing variability. It may be desirable, therefore, to know how closely elongation can be predicted if the modulus is known, and just how much elongation will decrease for one psi. increase in modulus.

The answers are provided mathematically by correlation analysis, which expresses the closeness of the relation between variables by the correlation coefficient —a number varying from 0 to 1. Zero indicates a complete lack of relationship, while 1 designates perfect correlation—that is, one variable can be predicted exactly from a knowledge of another. The relationship of one variable to another may also be expressed by an equation which provides a means of computing the magnitude of change in one variable when the other is changed.

Table III—Significance of Coefficient of Correlation According to Number of Samples

Number of Samples or Pairs of Observations	*Minimum Value Generally Accepted as Significant*
5	0.878
10	0.632
50	0.280
500	0.088

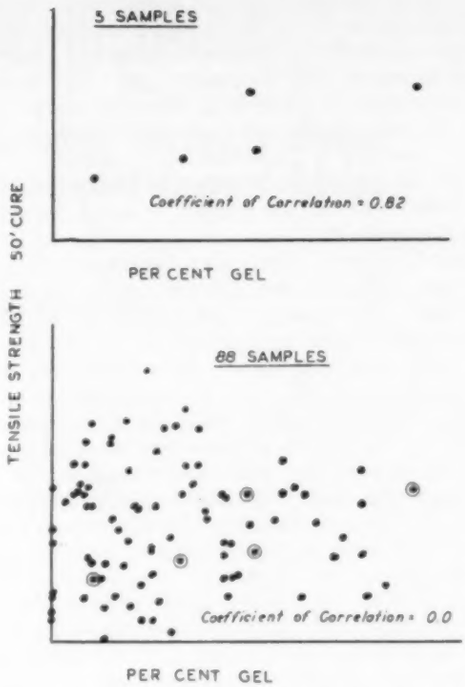

FIG. 12—Tensile strength vs per cent gel.

In factory data, correlation coefficients of 1, indicating perfect correlation, are, of course, never found, and high correlations, such as 0.8 or 0.9 are found very rarely. Even a low correlation, however, may be of great interest, for it shows that a definite relationship exists, even though the relationship may not be easily recognized visually due to the complicating effect of other variables. Fig. 11 shows the relationship between modulus and gel content* based on 88 controls produced over a period of time in a GR-S plant. The correlation coefficient is 0.36, indicating a fairly close and significant correlation.

Each correlation, it should be mentioned, must be tested for significance, which depends on the number of individual samples in the data tested. This must be done because data with only a small number of samples may give misleadingly high coefficients by pure chance alone. Table III lists the minimum value of the correlation coefficient which can be considered significant, for various sample sizes. It can be seen that for a large number of samples even a very low correlation can be significant. It is evident that the value of the coefficient for modulus versus gel (0.36) is well above the minimum required for 88 samples to indicate a significant correlation.

Paradoxically, a correlation based on a large number of samples as depicted in Fig. 11 is frequently of much greater significance than a chart showing an apparent degree of correlation based on a relatively few points. This is brought out in Fig. 12 where tensile strength is plotted as a function of gel, based on a relatively few observations, in the upper half of the graph, and

* Gel content is defined as that portion of the total raw polymer which fails to dissolve when soaked in benzene at room temperature, with no agitation, for a period of 48 hours.

based on 88 observations in the lower half. From the limited data as set forth in the upper part of the chart one might conclude from visual inspection that tensile strength increases with increasing gel. Application of statistical method to these data, however, shows a value of 0.82 for the correlation coefficient which is not significant, according to Table III, for 5 samples. Analysis of 88 samples gave a value of 0.0 which proved conclusively that no correlation existed between gel and tensile strength.

It should be stated that a non-significant value of the correlation coefficient does not necessarily mean lack of correlation. Frequently accumulation of further samples substantiates indications of trends shown by a few early samples, rather than exhibiting the reversal as set forth in Fig. 12. It is emphasized, however, that many scattered points with the correlation coefficient above the significant level is very much more reliable in determining correlation than a few points which may plot into a relatively smooth curve but in which the correlation is below the significant level.

Correlation analysis has been found to have a variety of applications. Where a high degree of correlation exists, it may be expedient to predict some value difficult to measure, such as electrical stability, by one easy to measure, as water absorption. By utilizing large quantities of data, it is possible to find out, for example, what effect the soap content, moisture, fatty acid, or a host of other variables, has on tensile strength, or modulus; how polymerization time affects rate of cure; what effect polymerization yield has on cut-growth; how ash content affects water absorption —to name but a few examples. Where a property has been observed to vary unaccountably, it has been found that correlation with all possible variables has often been successful in determining the cause of the variability encountered.

More advanced methods whereby several independent variables are correlated at once with one dependent variable have proved equally fruitful in the solution of problems continually being encountered as operation improves and more refined techniques become necessary *(10)*.

Conclusions

The application of statistical methods to the production of GR-S has been described briefly. Based on this experience the following conclusions are drawn:

1. The statistical concepts of frequency distribution, standard deviation, control charts, variance analysis, and simple and multiple correlation are powerful tools for the extraction of useful information from large masses of plant operating data.

2. Statistical methods may be applied in a "dynamic" sense for control of current operations or in an analytical or "historical" sense for the longer range development of more desirable operating procedures.

3. The use of statistical methods in the dynamic sense will not improve the process per se nor will it automatically correct operational deficiencies. Properly applied, however, it will indicate promptly and accurately when correctional measures are necessary.

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Sponge Rubber-Covered Table Helps Solve Production Problem

AN example of one of the many ingenious ideas which have spurred the flow of war materials from United States plants, involving the utilization of a non-technical idea in using sponge rubber, is reported by the B. F. Goodrich Company, Akron, Ohio.

Employees in a large industrial plant were having difficulty picking up the small metal parts used in the assembly of one product. The assembly line traveled past them faster than they could pick up the parts—but not faster than they could work. The chief trouble was that the workers fumbled the small parts and couldn't get them off the table at the speed necessary to keep up with the production line. To slow down the line meant lessened production of an article vital in the war program.

A Goodrich engineer suggested that the table be covered with a thin slab of sponge rubber, so the workers could get the tips of their fingers easily around the small parts and place them in the assembly. It worked from the start, and the assembly went off the line on schedule.

The sponge rubber slab can be as thin as 1/8 inch and still enable workers to get their fingers into it to pick up the parts, Goodrich believes, although different sponge thicknesses and densities may be required for some jobs.

The French Rubber Institute

A Review of Its Origin, Early Development, Struggle Under German Domination, Aims, Achievements, and Present Status

By JEAN LE BRAS

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THE Research Center of the Institut Francais du Caoutchouc (French Rubber Institute) was created in September, 1936, by the Union des Planteurs du Caoutchouc (Committee of the Rubber Growers). It had as its birthplace the organic chemistry laboratory of the College de France where Professors Marcel Delepine and Charles Dufraisse were kind enough to support it and guide its initial steps. Later on two laboratories were placed at its disposal.

Several well-known American technologists visited these laboratories while in Europe to attend the Rubber Technology Conference which was held in London in 1938. At that time the Institute was working in close cooperation with two similar organizations in operation in England and Holland, namely, the British Rubber Producers Research Association and the Rubber Stichting (Rubber Foundation). In its initial phase, the work of the Research Center was concentrated on the study of oxidizability and several articles were published on that subject under the guidance of Professor Dufraisse.

At the same time the Research Center was organized, a Propaganda Center was created, the main purpose of which was to encourage the use of tires and other rubber products in the field of agriculture. The Administrative Council, headed by Philippe Langlois-Berthelot and R. M. E. Michaux for research, and P. Petithuguenin for propaganda, decided that the work of the Institute should be enlarged and a project for the establishment and equipment of new laboratories was undertaken late in 1938. Early in 1939 a building was purchased at 42 Rue Scheffer in Paris and the work of organizing the laboratories was started. At the outbreak of the war in September, 1939, however, these laboratories had not been completed.

Mobilization for war naturally deprived the Institute of part of its personnel but the laboratories, nevertheless, continued their studies and undertook special war research. Installations of equipment continued to be made, but at a much slower pace. In May, 1940, the Institute took part in a Franco-British Rubber Congress held in Paris during which the new laboratories were officially dedicated.

With the fall of France in June, 1940, practically all of the personnel of the French Rubber Institute was scattered but fortunately succeeded in reuniting a few months later. Entirely cut off from the rest of the world and constantly threatened by the German authorities, the members of the Institute did not lose courage. Confident of final victory and persuaded by the necessity of working for the welfare of the country, the directors of the Institute returned to work.

A new plan of organization was created, one which would provide for the orderly development of the Institute as circumstances might permit. Contrary to programs which were instituted in England and Holland, the Institute was practically the only French organization given over to studies on rubber. Its work, therefore, had to be quite general and on this principle the present organization of the Institute was established, consisting of three major sections: (1) a Documentation Center; (2) a Research Center, and (3) an Application Center. The function of each of these centers is described below.

Documentation Center

This center is headed by S. Reizler. Its aim is to gather all scientific, technical, historical and commercial information on rubber. Such information is classified in as practical and convenient a way as possible and is placed at the disposal of all French rubber technologists. Although many books, bulletins, pamphlets, etc., are in the library maintained by the Documentation Center, it lacks American literature published since 1940. It is the hope of the Institute that it will soon be able to fill this gap through the cooperation of American publishers and some of the good friends of the Institute in the United States.

Publication of the *Revue Generale du Caoutchouc* has been in the hands of the Documentation Center since 1941, ownership of this important French rubber journal having been turned over to the Center by the Syndicat du Caoutchouc. Several complete sets of this journal have been put aside for distribution in the United States and will be forwarded to this country as soon as conditions allow.

In addition to articles covering the science, technique and economics of rubber in general published in the *Revue Generale du Caoutchouc*, brief abstracts on all of the work and patents related to rubber published in France, Belgium, Holland and Germany, have appeared in the *Revue* since 1941. These abstracts should prove most useful to American technologists and acquaint them with the work accomplished in Europe during the war years.

Research Center

The Research Center is directed by J. Le Bras, assisted by P. Compagnon on the scientific side, and A. Jarrijon on the technical side. It is divided into several branches as follows:

(a) Technical Instruction: Specialized instruction on rubber was not available in Paris prior to the war. In

1941 the Institute organized a series of elementary courses for the students of various educational institutions, including Ecole de Physique et Chimie, Institut de Chimie, Ecole Centrale and Ecole des Arts et Metiers. Since its organization, approximately 100 students have taken these courses each year. At the end of the course, 5 or 6 students are admitted to upper classes through competitive examinations. The upper class features a course covering a period of 18 months in the laboratories of the Institute in order for the students to absorb practical experience. The students must also work on a research project. Upon completion of this graduate course, they receive the degree of "Rubber Engineer."

During the course of their studies, the students are helped financially with fellowships generously provided by the Centre National de la Recherche Scientifique, Union des Planteurs de Caoutchouc, Syndicat du Caoutchouc, and similar private organizations. The training of the students is especially oriented in accordance with their specific preferences, that is, whether they prefer a career in the metropolitan rubber industry of France or whether they prefer work on the Indochinese or African plantations. Competitive examinations are also held for students in other large cities of France, such as Marseille, Lyon, etc.

(b) Scientific Research: Research work conducted in collaboration with the English and Dutch organizations was, of course, abruptly terminated in 1940. Contact has again been made with such organizations, however, and collaborative work will be continued. Although circumstances in France did not permit general and broad studies comparable to the remarkable work which has been accomplished by the B.R.P.R.A. under the direction of J. Wilson, some interesting research has been conducted, including the following:

(1) A study of the combination of natural rubber and several unsaturated derivatives, such as acrylonitrile, which takes place in emulsion and gives modified rubbers of special properties.

(2) A study of the direct combination of anhydride maleic and other similar products (maleinimid and its derivatives, for instance) with rubber by simple milling.

(3) The observation of two different mechanisms for the protection of rubber against oxygen.

(4) A systematic study of the different factors intervening during the process of milling the rubber and mixing the fillers.

(c) Agronomy: This branch of the Research Center is charged with liaison between the metropolitan organizations dealing with the study of rubber-bearing plants and the French colonial laboratories. It has studied the possibility of using the *Euphorbia resinifera* of Morocco and the *Euphorbia balsamifera* of Senegal. The former gives a kind of rubber which can be used but its latex has a small rubber content, while the latter yields a coagulum with good plasticizing qualities for GR-S type synthetic rubber and increases elongation possibilities. The branch has also kept in touch with the cultivation of *Taraxacum Koksaghyz* and studies its selection in collaboration with the Vilmorin laboratories.

(d) Standardized Tests: Standardization of rubber tests in France had only begun in 1938 within the framework of the International Standardizing Association. Entrusted by the Association Francaise de Normalisation with studies on latex and natural rubber, the Institute has perfected a number of standard tests. It is also cooperating with the Comite d'Organisation de l'Industrie du Caoutchouc and the Syndicat du Caoutchouc on standards for vulcanized rubber.

(e) Technology (Equipment): This branch of the Center keeps in touch with progress made on equipment used in factories and laboratories and on plantations. It also studies improvements needed in apparatus now in use in the laboratories of the Institute and is charged with building new apparatus. It has thus far developed a new model of dynamometer jaw, a new type of manometer to measure oxidizability, and a new dynamometer which permits the use of small test pieces and makes possible tests at different temperatures.

(f) Technical Research: The main object of this branch is to study new practical uses of rubber and new processing methods and to perfect the application of its own research. Among other work it has studied the use of ultra-violet spectrography for the analysis of accelerators and antioxidants, factors concerned with the thermoplasticity of chlorinated rubber, and methods of treatment of latex related to the Kaysam process. It has also perfected a new chemical derivative of rubber for bonding rubber to metals and plastics, this derivative being practically heat-proof.

Application Center

This center is directed by Mr. Demongeot. It is concerned with economic and commercial questions as well as anything connected with propaganda for the use of rubber. In cooperation with large French firms, it has perfected a special tire for farm use and in this connection had a film made showing the advantages of tires over the ordinary wooden wheels. Two films along the lines of technical instruction were also made, in cooperation with the Research Center, one showing the major operations of the rubber manufacturing industry and the other the properties of natural and vulcanized rubber.

Present Status of the Institute

The French Rubber Institute is currently housed in two buildings, the Documentation and Research Centers being in one, and the Application Center in the other. The Research Center occupies three floors, one for the apparatus used in compounding and processing and the other two floors by the chemistry, physics and agronomy laboratories. The Administrative Services are also housed in the second building, which features a conference room big enough to seat approximately 100 people and which is equipped with apparatus for the projection of films.

Special committees, composed of prominent French scientists, technicians and representatives of the major organizations interested in rubber, keep in close touch with the activities of the Institute. These committees hold regular meetings, are familiar with the work being done at the Institute, and their criticism, advice and suggestions are welcomed by the members of the Institute.

It should also be noted that since 1940 the Rubber Research Institute of Indo-China (Institut de Recherches pour le Caoutchouc en Indochine), with headquarters in the suburbs of Saigon, and the Rubber Research Institute of Africa (Institut de Recherches pour le Caoutchouc en Afrique), with headquarters at Bingerville on the Ivory Coast, have been created. Chemists and agronomists trained at the French Rubber Institute will join these allied institutes as soon as possible.

Use of Low-Angle X-Ray Scattering in the Study of Catalysts, Viruses, and Other Materials

By F. G. FIRTH

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TODAY, industry is becoming accustomed to the idea that X-ray diffraction is not only a useful tool for research but also a necessity for close control of technological processes. X-ray diffraction is a rather special type of X-ray scattering and has generally been applied to problems involving crystalline materials. Early investigators concerned themselves largely with scatter making a comparatively large angle with the primary beam. But about fifteen years ago the experimenters began to study the scatter occurring at very small angles.

An Important Research Tool

As time passed, there was accumulated increasing evidence that from scattering at these low angles very useful information could be obtained about many important materials. Now it has become clear that low-angle-scattering studies can play an important role in both research and in the control of industrial processes. It has been found especially useful in alcohol and petroleum production, carbon black manufacture, processing of synthetic and natural fibers, fabrication of asbestos-like materials, and in synthetic rubber and resin plants.

In many of the fields mentioned, catalytic processes play an important role. Already, low-angle-scattering studies have proven useful in development and control of catalysts. The theory of how catalysts function is not too well established at present. It is quite clear, however, that the extent of active surface (roughly, a function of the particle size) plays an important role. Studies of particle sizes to which low-angle-scattering seems especially sensitive will be referred to later in this article.

Initially, low-angle-scattering was studied mainly in cases where specific lines were observed at low angles. In these instances the low-angle-scattering was evidence of a crystalline-like arrangement of fairly large and uniform particles. Some years ago it was concluded that low-angle-scattering studies (in cases where no lines were observable) could also give useful information about important structural details of a different character. Since then there have been some papers covering studies of this character. Examples of each kind will be given later in this article.

While X-ray diffraction studies have been useful in determining the arrangement of atoms within a material, low-angle-scattering research provides information of a different character. From a functional view the low-angle-scattering data are perhaps of greater value.

Speaking rather loosely, one can say that low-angle-scattering of X-rays is to be observed when the specimen contains geometrical discontinuities (or particles) ranging in size from about 10 to 1000 angstrom units. (The angstrom unit is 10^{-8} [1/100,000,000th] centimeter.) It is furthermore necessary that the density of the material (to be more exact, the refractive index for X-rays of the wave length being used) on both sides of the discontinuities should be appreciably different.

An optical analogy that may be employed here involves the use of immersion liquids with the optical microscope. If a material consists of small particles—that have geometrical discontinuities in the useful range of the optical microscope—and it is immersed in a liquid of identical refractive index, the material will disappear. Similarly, in the case of low-angle X-ray scattering studies, if the geometrical discontinuities are not accompanied by appreciable contrasts of density (refractive index for X-rays) the particles become invisible to the X-rays and no appreciable low-angle-scattering is observed.

Role in the Biological Field

All this may appear somewhat theoretical and one may wonder how such studies may be useful. However, if we observe that some of the most important chemical reactions involve particles having geometrical discontinuities within the range specified for low-angle-scattering, the importance of this new technique becomes apparent. In addition, since many biological processes involve particles which fall in the low-angle-scattering range, it is quite probable that this new X-ray method can play a most important role in the biological field. Important studies along this line have been made by Bernal and his colleagues on proteins *(1, 2)*, particularly with regard to plant virus preparations.

In this work, by means of low-angle-scattering studies, it was possible, for the first time, to measure accurately the size of a virus particle. In these studies

crystalline-like aggregates of particles of identical diameter were present. Consequently, the low-angle-scattering diagrams contained sharp lines. Low-angle-scattering diagrams obtained from virus preparations of different concentrations clearly illustrate the influence of concentration on the X-ray diagrams. Actually, virus solutions in water can be looked upon as colloidal aggregates. Low-angle X-ray diagrams permit direct measurement of interparticle distance in these colloidal aggregates. It is probable that similar studies would prove useful in working with other colloidal systems, both organic and inorganic.

Some studies have been made using low-angle-scattering on aggregates of small inorganic particles, such as aluminum oxide, silica gels, and carbon black. Biscoe and Warren *(3)* have used both ordinary wide-angle and low-angle X-ray scattering to study the character of carbon blacks in which they were interested. Their results proved of considerable interest to the carbon black industry. The following is quoted from their paper: "Although small angle scattering measurements are not nearly as definite as those from line broadening, the results seem to indicate that in carbon black there is a clustering of the material, and that those clusters are of the magnitude of a few hundred angstroms. These cluster dimensions are of the same magnitude as the sizes determined by microscope counts and by the electron microscope."

Work has been done by Jellinek and Fankuchen *(4)* on gamma alumina, using both wide- and low-angle-scattering. In this work, gamma alumina, initially made with a very small particle size, was heated successively at higher and higher temperatures for longer and longer periods. Changes in the ordinary wide-angle and low-angle-scattering were observed. The wide-angle-scattering showed increasing sharpness of the gamma alumina lines, indicating both crystal growth and possibly an improvement in the quality of the crystal structure. At higher temperatures, traces of the transformation of the gamma alumina into corundum could be seen. Concomitantly, the low-angle-scattering showed clearly defined changes which indicated, qualitatively, growth of the alumina oxide particles. Extension of this work to other substances similar to alumina oxide will probably follow in the near future.

FIG. 1—View of newly-developed low-angle-scatter camera, with operator ascertaining correct placement of specimen in specimen holder. Note also other tracks and cameras in position.

In the high polymer field, particularly with regard to synthetic fibers, some interesting work has been done with low-angle-scattering, principally in Germany. In discussing similar work, Fankuchen and Mark *(5)* state, "A number of highly oriented polymers, such as viscose rayon, cellulose acetate, Nylon filaments and highly stretched rubber bands have been investigated. They all show more or less pronounced equatorial small angle diagrams, which can be accentuated according to Kratky by immersing the samples in liquids of distinctly different X-ray scattering power. In all cases, the meridian scattering in the observable angular range was so weak that one arrives at the presence of rather long (more than 500 Å) bundles of chains, the average widths of which are contained in the accompanying table (Table I). They range from 50 to 200 Å."

In some cases the meridian scattering is rather diffused but occurs in a kind of layer line; this indicates the presence of a super period along the fiber axis. Nylon has been investigated by Hess and Kiessig *(6)* and shows this super period to a marked degree. Recently polythene *(7)* has been shown to give a low-angle meridian scattering, almost identical with that given by Nylon.

Equipment and Technique

Low angle scatter equipment is basically comparatively simple (Fig. 1). A high power X-ray source supplying essentially monochromatic radiation of wave length between 0.7 and 3Å, a very efficient system of collimating this beam, a light-tight film holder with a front transparent to X-radiation, and a specimen holder comprise the essential parts. The X-ray tube usually has a target that is made of copper, iron cobalt, or chromium. The radiation obtained from these targets, after passage through a suitable filter (to remove the Beta radiation) is essentially monochromatic. The collimating system can consist of either slits or pin holes.

A typical system (Fig. 2) might consist of the following: A long brass tube a half inch in diameter (A) has inserted in one end a silver disc (B) with a slit aperture. Thirty centimeters away in the tube is situated another disc (C) with a similar aperture. Five centimeters from this is still another disc (D) with a corresponding aperture. The final disc is designed to prevent any edge scatter from the secondary primary aperture from hitting the photographic film. The specimen holder (E) is a very simple device, consisting of a plate situated normal to the direction of the primary beam, which is usually attached to the end of the collimating tube. In this plate is a slit which coincides with the collimated beam.

The film holder is made in the form of a light tight casette (F) of a convenient size, usually about 5" x 2". Situated about 1 centimeter in front of the casette and arranged so that the primary beam will strike it, is a lead stop (G) which is attached to the casette holder. This is to prevent the powerful primary beam from fogging the film.

The collimating system and casette support holder

(H) are both mounted on carriages that ride along a precision track which is set parallel to the optimum direction of the x-ray beam, which is about 6 degrees from the horizontal. The track is calibrated and the carriages have vernier index markers on them so that the specimen-film distance can be accurately measured. In order to get reproducible results it is essential that the equipment, though basically simple, be made with precision because of the extreme length of the beam. The central beam stop is made just large enough to stop the direct beam and any lack of precision would lead to the direct beam slipping past the stop and fogging the film.

Preparing the Specimen: It is usual in the case of powder specimens to reduce the powder to a standard agglomerate size by grinding in an agate mortar. This powder is then passed through a 200 mesh screen, a few milligrams being sufficient. A metal plate approximately 0.3 millimeter thick, which has punched in it a hole approximately 2 millimeters in diameter, is placed on a glass microscope slide. The powder specimen is then mixed with a material known to have no low angle scattering, which acts as a binder. (Collodion or ethocellulose seem to be quite satisfactory in this regard). The specimen and binder are then pressed into the plate on the microscopic slide and the surface cleaned off with a spatula. This provides a specimen of uniform thickness, in this case 0.3 millimeters, through which the collimated radiation is passed.

Amorphous substances can be prepared as specimens in some cases by merely pressing them into the plate, provided they have sufficient inherent binding power. In the case of fibrous substances, the fibre can be mounted by means of scotch tape or modelling clay directly across the aperture without the use of an internal binder.

Exposure Times: In the case of powder sample of an inorganic nature, exposure times are of the order of an hour or so with a specimen to film distance of about 40 centimeters. In the case of proteins and some other organic materials, exposure times may well vary between 2 hours and 200 hours. Fibrous substances, especially when a high degree of orientation is present, will give good exposures in from 1 to 8 hours.

Film Analysis: At present it would appear that two types of scattering are important and both types appear in special cases. If the specimen being studied has no special orientation within it, then of course all X-ray scattering, wide-angle as well as low-angle, will be radially symmetrical and no direction on the film measuring out from the center will be different from any other direction. Should, however, preferred orientation exist in some direction at right angles to the X-ray beam, then it will be observed that all of the X-ray scattering, wide-angle as well as low-angle, will lack

TABLE I

Substance	Average Width of the Crystallized areas in Angstrum unit
Tobacco Mosaic Virus	150
Fibrous asbestos	200
Highly stretched rubber.....	80
Drawn polyamide fiber.....	200
Highly oriented viscose rayon	50–200

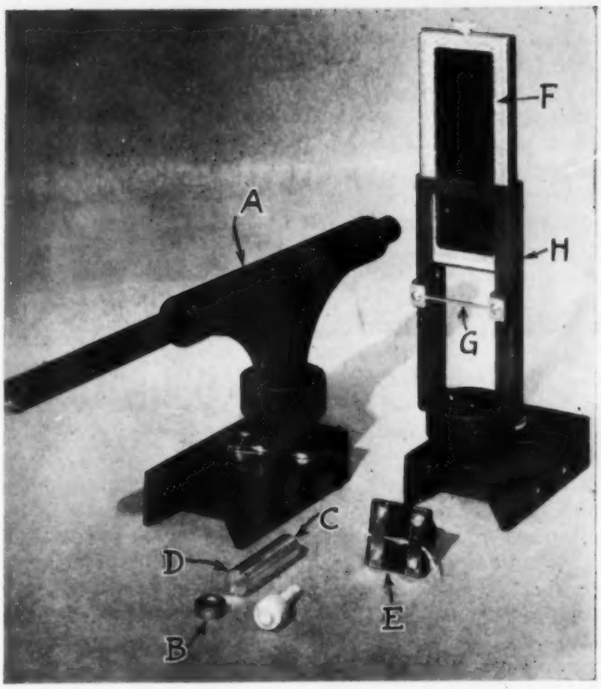

FIG. 2—Component parts of low-angle-scatter equipment (described in text).

radial symmetry, *i.e.*, the patterns will be spotty in character. Thus, if the specimen is a fiber oriented at right angles to the X-ray beam, we would expect generally to find that the low-angle scattering along the equator, *i.e.*, in the direction at right angles to the fiber length would be different from the low-angle scattering along the meridian, *i.e.*, in the direction of the fiber length, and indeed in cases where appreciable low-angle scattering has been observed such differences between equatorial and meridional scattering were found.

In both the equatorial and meridional direction two distinct cases have thus far been found. In one case the low-angle-scattering consists essentially of more or less sharp lines. In the other case the scattering is continuous in character, rising steadily in intensity with decreasing angle of scattering. Apparently the case in which sharp lines are observed is one in which particles are present whose diameters in the direction of which the scattering is observed are more or less uniform.

Two quite clear-cut cases have thus far been found in which the scattering in the equatorial direction consisted of sharp lines. These are the cases of tobacco mosaic virus *(1, 2)* and chrysotile *(8)*. In such cases it seems to be acceptable to use the Bragg relation which connects up the angle of diffraction with an inter-planar period. Actually, in such cases of low-angle scattering, a simplification in the computation can be made similar to that which is used in the case of electron diffraction, due to the fact that for small angles the sine and tangent are equal to the angle in radians.

In both cases the phenomena occur at low angles and for low angles the sign of the angle is essentially proportional to a distance measured on the photographic film. The computation of the spacings thus becomes simply a slide rule operation. When such computations were made for the two cases mentioned,

it was found that the sequence of spacings observed was in the inverse ratio of $\sqrt{1}$, $\sqrt{3}$, $\sqrt{4}$, $\sqrt{7}$, $\sqrt{9}$, etc. It can be shown that this sequence of lines is exactly that to be expected along the equator if the specimen consists of uniform cylindrical particles, packed parallel to one another and as compactly as possible.

From the spacings it is then possible to determine the diameter of these particles. Actually this turns out to be the $\frac{2}{\sqrt{3}}$ times the largest spacing observed, *i.e.*, the spacing of the innermost lines (which corresponds to the $\sqrt{1}$ in the sequence of square roots given above). In both cases electron microscope pictures have shown the existence of particles of a diameter corresponding to that computed from the X-ray low-angle-scattering.

The second kind of equatorial scattering is rather characterless, being very low in intensity at wide angles and rising steadily to a maximum at the lowest angles which can be observed with the present apparatus. By making a micro-photometer study of the low-angle blackening on the photograph film, one can obtain a measure of the intensity of the low-angle X-ray scattering as a function of the angle.

Biscoe and Warren *(3)* and Fankuchen and Mark *(5)* have given the equations and procedure necessary to derive from measurement of angular intensity of low-angle-scattering the particle size responsible for it. If the particle size is fairly homogeneous the interpretation is reasonably straightforward, but if an assortment of particle sizes is present some compromises in the interpretation must be made. With increasing inhomogeneity, the quantitative interpretation becomes naturally less and less reliable.

In the meridional direction, in the case of fibrous materials, both types of scattering have also been observed. Stretched rubber and cellulose fibers have thus far only given the continuous type of scattering, and this occurs with appreciable intensity only at exceedingly low angles, indicating that the particle size, *i.e.*, geometrical discontinuities in the direction of fiber length, are very large in magnitude. The other case, namely the presence of lines of diffuse maxima, has been observed along the meridian in the case of swollen Nylon *(6)* and polythene *(7)*. In both cases the maximum in the meridional scattering occurred at angles corresponding to a Bragg period of the order of magnitude of 100 Å units.

The origin of such a period is not at all clear, particularly in the case of polythene, but the X-ray evidence seems to be incontrovertible. Some kind of periodic structure in Nylon and polythene filament must exist and this structure undoubtedly plays an important role in determining the physical characteristics of the material.

Particularly in the case where the scattering is continuous in character precautions should be taken to eliminate experimental sources of error. Film having a low intrinsic fog should be used wherever possible and means employed to reduce the air scattering, especially at the lowest angles. Blanks or check films should be run in the apparatus with no specimen in the beam in order to determine the necessary corrections for chemical fog and air scattering.

For a long time the technical emphasis in many fields has been on chemical structure and there can be no denying the fact that the intrinsic chemical makeup of a material is directly related to its physical properties and possible uses. Nevertheless, we see more and more in diversified fields, such as heavy metals and plastics, that many factors other than the merely chemical play an important part in determining physical characteristics. Thus, in the metallurgical field the history of the treatment of the material is all important. Part of the history is the heat treatment or cold working to which it has been subjected, and while heat treatment or cold working generally do not change the chemistry of a material, they do affect its physical properties very markedly.

In exactly the same way, in the field of high-polymers and in the field of catalyst manufacture, the history of the material appears to be very important. It is an interesting fact that many of the desirable characteristics of such materials are dependent upon the obtainment of certain geometrical discontinuities whose magnitudes are determinable by low-angle X-ray scattering and whose presence and character are decided by the processing of the material rather than by its chemical constitution.

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Report of a Mill Accident

AN accident happened to a 65-year-old mill operator who had been operating mills for 19 years. The injured man was caught in a rag mill while feeding in reclaim. This employee had his right hand caught in the stock in the mill at the bite and instead of tripping the safety stop with his left hand, he tried to pull his right hand out with his left. As the result both hands were caught. His right hand did not go in above the wrist, but he lost his left arm at the shoulder. The mill was stopped by another operator.

This accident illustrates the need for constant alertness on the part of all mill operators and emphasizes the importance of not reaching beyond the safe limit, which is the point at the center of the front roll.

In addition, the stopping distances of mills and calenders should be checked once a week. In order that the mill operators will be familiar with the safety trip bar, each operator should trip the safety on his mill each day. Too much stress can not be placed on the point of having mill operators trip the mills as frequently as possible so that if they should get caught they will more or less automatically trip the safety.

Safety News Letter

First Report on German War Tires

Summary Report on the Production and Performance of German Synthetic Tires and Other Transportation Items*

Part I

IN order to obtain from the German Rubber Industry all available technical information of possible value to the American, Canadian, and British Rubber Industries, particularly for the prosecution of the war against Japan, a mission of experienced technical representatives from these countries was organized. The assignment was to investigate synthetic rubber and rubber products plants and to interrogate operating personnel as quickly as possible after capture by Allied Forces.

The three targets designated for investigation of transportation items were: Continental Gummiwerke A. G. (Hanover), Harburger Gummiwaren Fabrik Phoenix A. G. (Harburg), and Deutsch Dunlop Gummi Compagnie A. G. (Hanau). These three firms formerly accounted for about two-thirds of all German tire production facilities. The information in this report is mainly from Continental and Phoenix, since these plants offered better opportunity for survey than Dunlop.

The mission was successful in obtaining complete technical data on compounding, construction, processing, and production methods. To accumulate this information, voluminous records were examined and former personnel of these factories were instructed to submit written answers to questionnaires in addition to being thoroughly interrogated by team members. Important key personnel, such as managing directors, plant managers, chief chemists, and engineers were found alive, available and sufficiently cooperative. Some of these Germans had preserved original records. These records which were taken up and brought back to this country substantially corroborate the information obtained in the many discussions with these men.

Immediately upon their return from Europe, some of the American members of the team who made these investigations, met in Washington, D. C., with representatives of the Rubber Bureau of War Production, Office of Rubber Reserve, and a special industry subgroup of the Rubber Bureau's Tire and Tube Consulting Technical Committee. From all of the data available, these groups compiled and arranged the following summary report.

In addition to the many detailed records which have been here summarized, a vast number of documents which contain further details from other German tire and rubber product manufacturing units have been sent to the United States from Germany. All of these data in their original form can be made available to properly authorized persons for study.

This report is issued jointly by the Rubber Bureau of War Production Board and the Office of Rubber Reserve of Reconstruction Finance Corporation, Washington, D. C.

General Comments

1. German Buna S tires are no better and probably not so good as American GR-S tires with the same natural rubber content.

2. To obtain adequate tire mileage, loads and speeds in Germany were on a reduced basis. Poor quality due to high heat generation was alleviated by decreasing tread skid depth and removing breakers, thereby reducing the safety factor.

* Prepared by the Rubber Bureau, War Production Board, and the Office of Rubber Reserve, Reconstruction Finance Corporation, Washington, D. C. The investigation of the special mission of technical experts will be the subject of three additional reports, covering Mechanical Goods, Insulated Wire and Cable, and Drug Sundries. The report on Drug Sundries will appear in an early issue of RUBBER AGE. The reports on Mechanical Goods and Insulated Wire and Cable will appear in early issues of the *India Rubber World*. Members of the special technical mission included the following: Russell Hopkinson (U. S. Rubber), J. D. Fennebresque (Celanese Corp.), B. S. Garvey, Jr. (Goodrich), E. T. Handley (Firestone), R. D. Juve (Goodyear), J. W. Livingston (Rubber Reserve), Dr. Carl L. Monrad (Carnegie Institute), A. H. Nellen (Lee Tire), R. D. Schatzel (General Cable), J. E. Troyan (Phillips Petroleum), W. L. White (Manhattan Rubber), E. W. Glenn (Goodyear), E. R. Rowzee (Polymer Corp.).

3. Cooperative effort and joint considerations of technical data such as exists in the United States between manufacturer and user of synthetic; between industry, government, and the military; and among the units of the tire industry itself, was lacking in Germany.

4. The results of extensive road tests performed by military, by government, and by industry itself formed the basis of conversions in the United States. The running of tires on vehicles for the sole purpose of testing was practically non-existent in Germany.

5. In the United States there was an orderly, gradual conversion of products from natural rubber to synthetics, based on recommendations of the military and of government and industry committees after study of actual service tests and experience. In Germany the lack of government, industry and military cooperation as well as the critical shortages of materials undoubtedly prevented such planned conversions.

6. German technicians indicated that natural rubber, if available, would replace Buna in truck tires to improve quality and possibly even in passenger tires to facilitate processing.

7. The lack of sufficient natural rubber for inner tubes proved serious. The performance of 100% Buna tubes was unsatisfactory. Tubes of 25% natural rubber were in common use, but it was their opinion that at least 50% natural rubber was highly desirable. Apparently the Germans were not fully cognizant of our Butyl or Neoprene tube developments, since they were manufacturing elastomers of these types only on a very small experimental scale.

8. Buna S was being replaced by Buna S-3 as the principal Butadiene-Styrene rubber. Buna S-3 had improved uncured adhesive properties resulting in easier building and fewer defective tires. Buna SS, a high Styrene copolymer, was next in importance. There were several other Butadiene-Styrene rubbers for special uses.

9. Perbunan, a Butadiene-Acrylonitrile rubber, and sodium polymers of Butadiene appeared to be the only other types of synthetics manufactured on a large production scale in Germany.

10. The German Bunas as supplied by the polymerization plants were very tough and required heat softening prior to mixing of compound on mills or in Banburys.

11. Despite the added heat softening operation and the use of higher softener in compounds, it had been found necessary to decrease mixing equipment speeds and use longer times of mixing, resulting in extremely low efficiency as compared with American methods with GR-S. Mixing procedures are given in this report.

12. There were no data to indicate that these tough Bunas gave improved service quality in tires or tubes.

13. The tire plants, users of Buna, had asked for more workable rubbers. There is little evidence of serious interest on the part of the polymer manufacturers in supplying a softer product.

14. Production equipment and methods generally followed American practices.

15. Rayon was used in all tires, including passengers. Cotton was critically short; however, the Germans definitely would prefer rayon for all tires even though cotton were available.

16. Two compounding materials, Koresin and Plasticator No. 32, are unlike anything in general use in this country. Koresin may be of considerable interest as a tackifier and the latter as a plasticator or processing aid.

17. Reclaiming methods in Germany were not advanced. As a result reclaim was not a preferred compounding material, and it was used mainly in products other than tires.

18. Much detailed information on tire compounds, construction and production methods was obtained. This is summarized in the section on German Tire Production.

19. Curing bags were of Buna and the performance poor.

20. A central laboratory for rubber research and development had been established under I. G. Farben at Leverkusen. This was a large, modern, well-equipped and well-manned institution.

21. Data, reports, and documents from which this report is summarized are on file in Washington.

German Tire Performance

After carefully considering all evidence, opinions, and such data as were available, the American members of the team formed the opinion that German tires of Buna S are no better, and probably not so good, as American GR-S tires with the same natural rubber content.

The German industry had no centralized road test program, in fact even the largest German rubber company, namely Continental, lacked a road test fleet. Furthermore, there was no close collaboration in tire development and testing between the German army and their rubber industry. Obviously under these conditions it was difficult for the investigators to properly evaluate the relative quality of German Buna tires and German pre-war natural rubber tires, and impossible to get a comparison between German Buna and any kind of American tire.

A number of German made tires of known compounding and construction specifications have been shipped from the Continental and Phoenix plants to the United States. These are being used for evaluation of German Buna tire quality by making comparative road tests.

Separations: At both Continental and Phoenix it was brought out that the main tire difficulties arose from the high heat generation characteristics of Buna S. Separations were such a problem that several major construction changes had to be made before adequate service was obtained:

(a) To reduce carcass thickness and consequent tire heat, all rayon truck tires were made with two less plies than pre-war construction natural rubber tires.

(b) The design depths on all truck sizes were decreased. It was brought out that this change was solely to reduce tire thickness and obtain a cooler running tire.

(c) Separations had been so prevalent at the breaker edges that German practice was to make tires without breakers.

Considerable care had to be exercised in tread preparation to minimize separations. At Phoenix it was claimed that machine buffing the under side of the tubed tread after washing with a Buna cement had reduced separations. In the Continental plant, undertreads were calendered directly on to the hot tubed treads for some sizes of tires, and for others the treads were thoroughly buffed and cemented

The Germans further were of the opinion that Buna

S-3 had proven superior to Buna S from the standpoint of better adhesions, both while building and in the cured state. This resulted in improved performance because of fewer road separations.

Even with all of these tire changes, it was necessary to reduce loads and speeds below pre-war standards. In considering tire operating conditions, it should also be borne in mind that general temperature levels are not as severe in Germany as in many parts of this country.

Body Failures—Bruises, X Breaks, etc.: The modifications made to reduce separation failures had, as would be expected, brought about an increasing number of fabric failures. As a result, methods of improving carcass strength were under consideration. The Phoenix engineers expressed a desire to return to the use of breakers, but fear of separation at the breaker edge deterred them. The use of heavier cords or an increase in number of cord ends was being discussed. The Continental development staff felt that with the other improvements that had been made, the replacement of breakers should be re-investigated. Tires with breaker strips had been produced on a trial basis during recent months, but no production specification was in effect. Also at Continental the 34 x 7 Military tire had been changed from 8 to 10 plies, but there was no indication that there was to be a general ply increase in other sizes.

Tread Cracking: Apparently tread cracking had not been a major shortcoming of Buna S tires, although there was evidence that the German tires were definitely not entirely free of this defect. Continental said, for example, that it was no problem for them, but that two other manufacturers, whose names were not given, were having the trouble. From Phoenix the information was that rib designs were subject to tread cracking but other types of designs were satisfactory.

It was emphasized that tread design reductions were to cut down tire thickness and heat generations and that tread cracking conditions had little influence on this decision at Continental.

Inasmuch as there appeared to be no great concern regarding cut growth, it is understandable that extensive tire compound studies bearing on this subject had not been made.

In commenting on tread cracking, it should again be noted that German service conditions of loads and speeds and especially climatic conditions are much different than are encountered in the states.

Although there appeared to be little concern regarding this subject on the part of the Germans, it is interesting to note that an industry tire service report of October, 1944, comments that "although X breaks and diagonal breaks were the main cause of failure, the increasing number of failures due to tread cracking should not go unnoticed."

Rating of Tires: The Phoenix engineers estimated that the rayon passenger tires of 100% synthetic would develop approximately 80% of the mileage of pre-war natural rubber tires. There were no outstanding types of failures in passenger tires, the main reason for the tires averaging 80% of the natural rubber was the larger percentage of road failures due to factory defects.

As the size of the tires increases, the service rating decreases. Medium sized truck tires gave 70-75% of the mileage of pre-war tires, whereas truck tires of ten or more plies would deliver 50-60%. However, to obtain this 50-60%, loads and speeds had to be below pre-war standards.

General: Tire constructions were, by government order, either of 100% synthetic or 86% synthetic and 14% natural rubber. In the latter construction the treads were 100% synthetic. All the rubber was in the carcass and distributed throughout the carcass rather than concentrated only in the outer section of the casing.

During the last few months of operation Phoenix made all tires of 100% synthetic rather than 86% synthetic, which would have been permitted whenever sufficient natural rubber was available. The 100% synthetic tires were more difficult to manufacture. Production was slowed down and there were more factory defects. Because the higher percentage of factory defects would reduce over-all average mileage, the 100% synthetic tire gave a poorer average than the 86%. However, if perfectly made tires of the two constructions were compared, the Germans felt they would give equal performance.

Continental had no comparisons with American tires of any synthetic constructions. Apparently the German army, if they had any captured American tires, did not give them to Continental for test. The German companies seemed to have no knowledge as to the manufacturing methods, compounds, constructions, or quality of the tires made here.

Although the German rubber control board apparently imposed certain restrictions on the industry, no specifications were furnished directly by the army. From time to time the tire manufacturers sent service engineers to examine lots of Buna S tires returned from army service. One report of the examination of nearly 1,300 tires showed about 3% as having gone out of service due to normal wear; of the remainder, 400 tires were classified as "factory defects", and 850 as "service conditions".

A report dated September, 1943, states that of a total of 1,150 tires examined only a small number were from the newest production specifications, that is, April, 1942. For this reason, the report stated, no particular information of value was obtained.

The investigators were told that the I. G. Farben Company, who are the manufacturers of Buna S, were trying to show that synthetic tires were equal to natural rubber tires. It is significant to note, however, that the technicians in the tire manufacturing plants definitely expressed a preference for natural rubber, indicating that if available they would want to make tires of the natural product.

Materials—Types of Buna

Three general classes of Bunas were being made in Germany. The principal one, accounting for most of the production, was the Buna S—butadiene/styrene emulsion copolymer type. The others were the oil-resistant Buna N emulsion copolymers of butadiene and acrylonitrile, and the numbered Bunas, sodium or potassium polymers of butadiene. Latices of the first two classes were also being made and used in rubber products manufacture.

The Germans had made the American rubbers, Butyl and neoprene, only on a restricted experimental basis.

A. *Buna S Rubbers — Butadiene/Styrene Copolymers:* There were three of these in common use:

Buna S, S-3, and SS. Several, such as SSE, SSGF, SR and SW, were made in limited quantity for special purposes. The principal Bunas were made by a continuous process at approximately 50° C. and 60% conversion. It will be seen from the Defo numbers (see note below) that these rubbers were far tougher than American GR-S. As discussed later in the report, this necessitated an extra heat-softening operation prior to compounding and mixing.

There is no supporting evidence that this tougher and more difficult processing German rubber imparted superior quality to tires or other rubber articles. Brief descriptions of these Bunas and their average Defo plasticity values follow:

BUNA S—DEFO 5000. This copolymer is made with a charging ratio of about 70 Butadiene/30 Styrene. The principal emulsifying agent is the soap of linseed oil fatty acid. Buna S was formerly the standard German general-purpose rubber now largely replaced by Buna S-3. (Buna S-1 and Buna S-2 were sometimes used to distinguish between Buna S as made at two different plants. They were essentially the same.)

BUNA S-3—DEFO 3000 is made with approximately the same charging ratio as Buna S but uses paraffin fatty acids and Nekal (sodium diisobutylnaphthalene sulphonate) as emulsifiers. This newer variety appeared to be replacing Buna S. Due possibly to a lower soap content, it had better adhesion properties in the uncured state. It was reported that the improvement in building properties brought about a decrease in factory defects which in turn meant that fewer defective tires went into service, with a resultant improvement in over-all tire mileage. A shortage of linseed oil apparently had necessitated the change to Buna S-3. The advantages were found after its adoption.

BUNA SS—DEFO 4000. This is a high styrene rubber probably made the same as Buna S except that the charging ratio is approximately 50 Butadiene/50 Styrene. It is superior to the low styrene rubbers in extrusion properties and therefore finds use in such stocks as beads, flaps and many non-tire items. Inner tubes were formerly made of Buna SS but had the serious shortcoming of stiffening or hardening at low temperatures with consequent loss of air. In addition to poor cold resistance the high styrene rubber has lower elasticity.

BUNA SSE—DEFO 2500 is made to the same formula as the high styrene SS, but it is stabilized with OKC Resin (oxycresyl camphone) instead of the usual phenyl beta naphthylamine, and is made iron free by using special wash water. Buna SSE was developed primarily for the production of pharmaceutical goods. In tire manufacture it had been found that SSE when properly broken down produced cements of improved tackiness.

BUNA SSGF—DEFO 3300. It is claimed that this special grade is odorless and does not impart taste, making it useful in the manufacture of articles for the food industry such as jar rings, closures, etc. SSGF is 50 Butadiene/50 Styrene polymer in which the linseed oil is replaced by paraffin fatty acid and Nekal. Oxycresyl camphone is the anti-oxidant. The latex is stripped and the rubber is washed with special care.

BUNA SR—DEFO 3500 has better cold resistance than Buna SS and improved tubing and calendering properties. SR contains a mixture of high and low gel rubbers. It is made by coagulating equal parts of Buna S and Buna R latices. Buna R is made the same as Buna S except that in the last reactor the temperature is raised to about 80°C and the conversion run to 96%. This results in a high gel rubber with a somewhat higher styrene content than Buna S.

BUNA SW—DEFO 650 is a polymer developed especially for cold resistance. It is so soft that it is difficult to process. Buna SW is made with a charging ratio of 90 Butadiene/10 Styrene using Nekal as a principal emulsifying agent.

B. *Buna N Rubbers — Butadiene-Acrylonitrile Copolymers:*

PERBUNAN—DEFO 2500. Perbunan is an oil-resistant polymer made with a charging ratio of approximately 75 Butadiene/25 Acrylonitrile.

PERBUNAN EXTRA—DEFO 3200. Perbunan Extra has better oil resistance than Perbunan because of the higher nitrile content. The charging ratio is approximately 65 Butadiene/35 Acrylonitrile.

C. *Numbered Bunas—Sodium Polymers of Butadiene:*

BUNA 32 is a viscous low molecular polymer produced from Butadiene by the sodium polymerization process.

BUNA 85—DEFO 1400 is a potassium polymer of Butadiene of higher molecular weight than Buna 32. It is used particularly for the making of hard rubber with good chemical resistance and high heat stability and also has excellent electrical characteristics. Even with its low Defo hardness, it is difficult to process.

D. *Latices:*

IGETEX S is the latex from which Buna is obtained. It was available in 30% concentration (as manufactured) or concentrated to 45% total solids.

IGETEX SS is the latex of high styrene Buna SS concentrated to 45% total solids.

IGETEX NN is the latex of Perbunan Extra concentration as manufactured.

IGETEX NN is the latex of Perbunan Extra concentrated to approximately 45% total solids.

An obvious question arises as to the desirability or justification of making a synthetic rubber which is too tough to process before heat softening.

The members of the investigating team spent considerable time at the several targets discussing this heat-softening of Buna rubbers. As a result of all these talks it can be said that the tough rubbers were made chiefly because they gave better laboratory results as to tensile, rebound, and other physical properties. It was also suggested that the heat softening process improved tack. It was pointed out to the

Note: The Defo test measures the fixed deformation of a Buna test piece under variable loads. Test pieces 10 mm. high and 100 mm. in diameter are prepared from a composite sample of Buna. The Defo number is the weight of the load in grams, required to compress the height of the test piece from 10 mm. to 4 mm. in 30 seconds at a temperature of 80°C. The instrument which is used in making the Defo test is known in detail, but since it is elaborate and of little current interest in this country, it is not described here. A Defo number of 500 is approximately 50 Mooney (ML-4), while a Defo number of 5000 is above 200 Mooney (ML-4).

head of the Synthetic Research Laboratory at Leverkusen that even though the tough rubber showed better laboratory properties the advantage would probably be dissipated because the rubber had to be heat-softened before it can be used for tires. In addition it is necessary to use high percentages of softeners in compounding in order to make the rubber workable on mixing, extruding and calendering equipment. It is known that high softener content adversely affects quality.

The research man's answer to this suggestion was that the tough rubber was a better rubber, and that the synthetic manufacturer could not tell the tire company how to process Buna S. German tire technicians, on the other hand, stated that softer better processing rubbers had been requested. However, there was no evidence that tire tests had ever been run comparing heat-softened or unsoftened rubber with a softer polymer. Apparently cooperation or understanding was quite lacking between the synthetic rubber maker and user.

Briefly then, the investigators found no evidence of superiority of Buna S or Buna S-3 over standard American GR-S.

Materials—Compounding Ingredients

A. *Blacks and Other Pigments:* Of the several types of blacks shown in the tire and tube formulations the principal ones are:

1. Channel black (CK3 or CK4, depending upon source) which seems to have processing properties similar to EPC. Claims are made that it is of more uniform particle size than American channel blacks, and that because of better reinforcement the abrasion resistance of synthetic stocks was improved.

2. Black P-1250, a semi-reinforcing acetylene black used often in conjunction with CK blacks in carcass and inner tube stocks, etc., and also in conducting rubber stocks.

3. Lampblacks were employed to some extent in tire carcasses and for special uses. So-called "heavy" lampblacks were used in tires and light lampblacks in many mechanical goods. There appeared to be a number of grades designated as Durex Superior, Durex-O, etc.

Several other blacks were indicated, but based on the small usage they were of no general importance. It should perhaps be mentioned that German blacks to a large extent were produced from materials other than natural gas, for example from acetylene and from naphthalene. The only pigment other than black which found use in tire compounding was zinc oxide, appreciable quantities of which are shown in some carcass compounds.

B. *Softeners and Plasticizers:* A considerable number of softeners appear in the tire stock recipes. The German Buna required more softener than does GR-S and usually several were used in a given compound. Availability may have had a bearing on the number of different materials that are shown.

In German practice masterbatches made of Buna and softeners were often used to improve mixing efficiency. The usual materials as pine tar, stearic acid, rosin, cumar and several waxes appear in German formulas. Naftolen was used in considerable quantity, probably because of availability and low cost. In addition the following appear most frequently in the recipes:

1. Kautschol — a brown, tarry substance obtained from the distillation of low grade coal or lignite.

2. Kakol—a 50-50 mixture of Kautschol and rosin, used as a Koresin substitute when the latter was not available.

3. Aktiplast—zinc salts of C-10 and C-11 synthetic fatty acids used to replace stearic acid.

4. Softeners WA-3 and WA-4—wool-grease substitutes.

5. W-77-dibutyl thiodiglycollate—used to improve low temperature properties.

6. Resinol—55 mineral oil and 45 rosin.

7. Plasticator RA—residue from ethylbenzene distillation.

Two materials were unlike any in general use in this country. They are:

1. Plasticator #32—This is Buna 32 which, as described before, is a viscous low molecular weight sodium polymer of butadiene. It was used rather extensively in many compounds as an aid to processing. Extrusion and calendering characteristics were improved appreciably.

2. Koresin—a highly regarded tackifier which is a tertiary butyl phenol-acetylene condensation product.

Koresin in the German compounds deserves special mention since the simple study of their tire formulations does not reveal the desired amounts of or full reasons for the use of this material. In the first place, since the production of Koresin was insufficient to meet the demands of the Industry, it was used sparingly or eliminated altogether in places not considered highly important. If greater supplies had been available, increased quantities would have gone into formulations and more compounds would probably have contained Koresin. Secondly, it is claimed that the use of Koresin was not only to save natural rubber but to improve quality. Koresin in such places as tread cement and in the ply freshening solution was considered as particularly essential because German tire technologists believed it bad practice to use a natural rubber cement between Buna plies or under the Buna tread. It was the definite opinion that a better tire was produced with a Koresin wash than with crude rubber cement.

The only place where a crude rubber cement was permitted was at the tire machines in the ply turn-up around the bead where some of the tire constructions required a tackier adhesive than could be obtained with Koresin and Buna.

There have been indications that the use of Koresin in carcass stock made possible the building of tires without a post-calender cement dip. Attention is called to the fact that, generally, German carcass stocks had high zinc content. It does not follow necessarily that Koresin used in the American type carcass stock compounds with fairly high black would react in the same manner as the zinc carcasses.

A typical formula is shown below of a freshening solution of Koresin:

KORESIN SOLUTION

	parts by weight
Koresin	3
Cyclohexanone	5
Toluol	5
Gasoline	87
Total	100

TABLE I—GERMAN RAYON CORD SPECIFICATIONS

Construction	13/2/3	33/5/3
Tensile-minimum (Kg.)	9	9
% Elongation (@ 4.5 Kg. Load)	10.5*	10.5*
% Elongation-total	21 *	21 *
Gauge (mm)	0.86	0.86
Count-Ends (per cm)	7.7	7.7
Picks (per cm)	1	1
Area Weight (g/sq.m)	440	440
Cord Weight (g/1000 m)	53	53
Twist & Direction:		
Single (Turns/m)	S170	S260
Ply (Turns/m)	Z680	Z700
Cable (Turns/m)	S340	S340
Roll Width (cm)	160	160
Roll Length (m)	450	450
Tensile-minimum (pounds)	19.8	19.8
% Elongation (10# Load)	10.5*	10.5*
% Elongation-total	21 *	21 *
Gauge (inches)	0.034	0.034
Count-Ends (per inch)	19.6	19.6
Picks (per inch)	2.5	2.5
Area Weight (oz/sq/yd)	15.5	15.5
Cord Weight (Cord size)	1.12	1.12
Twist & Direction:		
Single (Turns/inch)	4.3	6.6
Ply (Turns/inch)	17.3	17.8
Cable (Turns/inch)	8.7	8.7
Roll Width (Inches)	63	63
Roll Length (Yards)	490	490

* Plus or minus 1.

Notes: (1) These specifications are for inner ply cord fabric. Specifications for outer ply are the same except the count is 5.5/cm (14/inch). Picks are 2/cm (5/inch), and area weight is 310 g/sq/m (11 oz/sq. yd.). (2) Testing conditions: 20° C., 65% RH; machine speed: 300 mm/minute. (3) Weights at 11% moisture.

Due to the shortages of cyclohexanone and toluol, 10 parts of benzol were substituted recently.

When a cementing of plies is necessary, a Koresin-containing Buna stock is used as a basis for the cement, this being dissolved in gasoline to the consistency desired. One of the stocks in such use was:

KORESIN-CONTAINING BUNA STOCK

Buna S3	100. 0
Kakol*	5. 0
Koresin	10. 0
Black CK4	15. 0
Black P1250	15. 0
Zinc Oxide—Coarse	5. 0
Vulkacit AZ†	1. 0
Altax	0.25
Sulfur	4. 0
	155.25

*50-50 mixture brown coal tar and rosin.
†Vulkacit AZ—similar to Santocure in curing effects.

C. *Accelerators:* Mercaptobenzothiazole, benzothiazyl disulfide, diphenylguanidine and Vulkacit AZ, which is a condensation product of mercaptobenzothiazole and diethylamine, said to be similar to Santocure in its curing effects, accounted for practically all German accelerator requirements. Apparently no accelerators that may have been developed in Germany proved superior to any of the standard materials.

D. *Anti-oxidants:* Phenyl beta napthylamine was the most common anti-oxidant in use in compounds. This same chemical was apparently used in Buna polymerization perhaps in lesser quantities than have been used here. Anti-oxidant 4010 appears in a few formulations. This may be a condensation product of cyclohexanone and amidodiphenylamine, and was said to be a paraphylene diamine derivative.

E. *Reclaim:* Reclaim was generally not accepted for use in tires. It can be said that German reclaim was generally inferior to American reclaim. No effort was made to keep the crude and synthetic tires separate at the reclaiming plant since the synthetic tires had not been properly marked by the manufacturers. All the Germans with whom this subject was discussed admitted that the quality of German reclaim had deteriorated because of this. Reclaim dispersions were not used.

Materials—Textiles

A. *Rayon:* The fabric used in all wartime tires has been rayon in both cord and square-woven types. Apparently cotton was in critically short supply, but it was stated that rayon cord would be preferred for passengers as well as trucks even though cotton were available. It is possible that cotton would be normally used for square-woven, but apparently no trouble has been experienced with rayon chafers, flippers or bead wrap.

All rayon was made from Swedish wood pulp and apparently no improvements had been made during the war, either in the raw material used or in the finished characteristics of the rayon yarn.

Several independent mills supplied the woven fabric to the rubber companies. Some rayon fabrics were furnished already impregnated with a haemoglobin treatment. Usually, however, the fabric was dipped at the rubber plant.

There appeared to be two constructions for vehicle tires, both cabled cords—a 33/5/3 and 13/2/3. These two cords have the same cord size and equal strength and elongation characteristics. The Germans used yarn numbers instead of denier to designate yarn size. The 33 yarns would correspond to a 275 denier against an approximate 690 denier for the 13 yarns. Airplane tires employed a 33/3/3 rayon and experimental work was being done on "Perlon" which was claimed to be the German equivalent of Nylon.

Both the 33/5/3 and 13/2/3 were supplied with approximately 20 ends per inch for inner-plies and 14 for outer-plies. After dipping, doughing (which operation is described later in the report), and calendering, the cord count increases to 24 to 25 per inch for inner-plies and 18 to 20 for outer-plies. Examples of specifications for 33/5/3 and 13/2/3 constructions for inner-plies are shown in Table I.

It is brought out later in this report that German practice generally was to use two less plies in a given size tire than in this country. It should be noted at this point that the rayon cord used by the Germans is considerably heavier in gauge and in weight than 1100/2 used in this country. German rayon fabric weights approximate that of standard cotton.

The two vehicle tire cord constructions, having the same physical characteristics, were used interchangeably. Phoenix expressed a slight preference for the smaller denier yarn. Continental stated that while laboratory tests had shown some difference in fatigue characteristics, the difference was not great and a true evaluation of the cords in actual road service was difficult to obtain.

In the interest of increased production, it had been decided to adopt the heavier yarn as rapidly as production facilities could be converted. Yarns heavier than the 690 denier, as for example our 1100's, had

apparently not been given consideration as no development projects appeared underway.

Specifications of square-woven fabrics are also shown (Table II). Staple or spun rayon was used in square-woven constructions in order to obtain better rubber-to-fabric adhesion.

B. *Perlon:* The 33/3/3 rayon construction for airplane tires was used to obtainer greater fatigue resistance. To offset the small size of this cord, two, four, and even six more plies than former cotton tires were used in order to have a sufficient safety factor.

Plane loads had progressively increased during the war without design changes to allow for increases in tire size. For example, it was stated that the Messerschmit had increased in weight from 12,000 to 20,400 kilograms with no increase in tire size. This placed more burden on the tire manufacturer to produce tires with an adequate safety factor for the increased load.

Examination of captured American bomber casings had shown them that this country was using an improved cord (Nylon) in these tires. In view of the fact that the Germans had been troubled with bruises and blowouts on their bomber tires, they were eager to produce a similar type cord. To meet this situation, a tire cord of 33/3/3 Perlon construction was being developed by Continental. The number of plies for Perlon was the same as for rayon.

It was claimed that Perlon tires were much better from a shock standpoint and twenty-five to thirty per cent better for fatigue than the best rayon airplane tire construction. The difficulty was with tire growth and it was indicated that no progress had been made on the reduction of Perlon elongation.

Phoenix was also doing experimental work on Perlon. Perlon specifications for a 33/3/3 as well as a 45/3/3 cord are given in Table III. It is the understanding that in order to reduce the elongation of Perlon to approach that of rayon, experimental samples had been made by stretching the Perlon yarn from the 33 size down to 45. This reduced the tensile strength and size, making it necessary to use more ends per inch in the finished cord to compensate for the strength deficiency. Some tires were made up with this cord just prior to the end of the war but no details regarding performance had been obtained.

The only sample of Perlon which could be found was a small piece of skim coated cord which is being shipped to the United States.

C. *Steel Wire:* Continental had made tires using a steel wire construction for the carcass on an experimental basis. It was found that high pressure was necessary in wire tires which made them objectionable from a vehicle maintenance standpoint. They stated that sidewalls of the wire tires broke down at 30,000 to 40,000 kilometers as did Michelin wire tires.

TABLE II—SPUN RAYON SQUARE WOVEN SPECIFICATIONS

Construction	20/3	20/4
Tensile-Warp (Kg.)	80	50
—Fill (Kg.)	90	50
Count-Warp (per cm)	8.6	5
—Fill (per cm)	9	5
Weight (g/sq/m)	290	210
Roll Width (cm)	150	150
Roll Length (m)	290	150
Tensile-Warp (Pounds)	176	110
—Fill Pounds)	198	110
Count-Warp (per inch)	21.8	12.7
—Fill (per inch)	23	12.7
Weight (oz/sq/yd)	10.2	7.4
Roll Width (Inches)	59	59
Roll Length (Yards)	316	164

Notes: (1) Tensile sample is 30 x 5 cm. (2) Testing conditions are same as for cord, except machine speed is 100 mm/minute. (3) Weights are at 11% moisture.

TABLE III—EXPERIMENTAL "PERLON" SPECIFICATIONS

Construction	33/3/3	45/3/3
Tensile-mm (Kg)	13	9
% Elongation (@ 4.5 Kg. Load)	17	16
% Elongation	45	30
Gauge (mm)	0.52	0.41
Count-Ends (per cm)	12	16
Cord Weight (g/100 m)	30	21.5
Twist & Direction:		
Single (Turns/m)	S60	S60
Ply (Turns/m)	S700	Z580
Cable (Turns/m)	Z400	S480
Tensile-mm (Pounds)	28.6	19.8
%Elongation (10# Load)	17	16
%Elongation	45	30
Gauge (Inches)	0.024	0.016
Count-Ends (per inch)	30.6	40.7
Cord Weight (Size)	1.98	2.76
Twist & Direction:		
Single (Turns/inch)	1.5	1.5
Ply (Turns/inch)	17.8	14.8
Cable (Turns/inch)	10.1	12.2

Production Equipment

The surveys of the three German plants revealed nothing unusual as regards the main types of equipment used in the various production operations. For mixing there were No. 11 Banburys as well as some smaller sizes. Werner-Pfleiderers of various sizes were used both for the making of cements and mixing compound stocks. The mills were from 84" wide down to 30". The Germans had no plasticators. The only modern mill room was the Continental (Nordhafen) where there was an excellent layout of No. 11 Banburys.

The speeds of all mixing equipment are considerably lower than in the United States. These reductions were found necessary in recent years to prevent the overheating of Buna stocks during mixing despite the fact that in all of the plants visited, cooling water was plentiful and relatively low in temperature.

The stock take-off and cooling equipment at Continental was unique. The workability, however, depends upon long mixing cycles, and it is felt that it could not be adapted to our short batch times.

Rayon dipping equipment had not been as highly developed as in the United States. All tire cord calenders are of the four roll type. Extrusion machines appear to be standard as do the warm-up mills.

Bias cutters, tire machines and building drums were generally similar to American equipment but not as

up-to-date. In the curing rooms, individual and pot heater vulcanizers are employed.

Most of the tire molds at Continental were of the type in which cast steel inserts or sections are fitted into a mold back. The mold backs are grooved in such a way as to permit each segment to be started in a rectangular slot, and then slid around circumferentially in a key shaped slot to its proper position. Only the last segment of each mold half requires positive fixing by means of screws.

Molds of this construction have been used in Germany over a period of years and it is claimed they proved entirely satisfactory.Sample inserts have been shipped to this country for examination.

Some of the molds at Phoenix were made by quite a different procedure. A metal cement or paste is forced through holes in the mold back to fill a cavity between the inside of the back mold and a section of a master ring or casting piece on which the design is carved. After the one segment of the insert is thus formed in the back mold, the master section is moved to the next position to repeat the design and so on around the entire circumference.

This method appears to be somewhat crude, but the Phoenix engineers claimed that rings prepared in this way lasted up to two years in pot heaters and considerably longer in individual vulcanizers.

(To be Continued)

Precautions to be Observed in Cleaning Stored Machinery

RECONVERSION means that much of the machinery stored for the duration needs cleaning before it can again be used. Plants using organic solvents for this purpose, many of them handling these chemicals for the first time, should take special safety precautions against fire and illness.

Solvent vapors can be injurious to the health. Good ventilation is therefore essential wherever solvents are employed. Best procedure is to use properly designed degreasing equipment or a mechanically ventilated spray booth. If a plant which has no such equipment must do a considerable amount of machinery cleaning, it may be advisable to install a special ventilator for handling the solvent vapors. This ventilator may consist of a motor-driven blower which draws the contaminated air from the breathing level and also from the floor level, where the heavy vapor tends to collect. Small parts may be cleaned under a ventilated hood. Such apparatus is not very expensive, and may be used safely when designed and installed under the supervision of a degreasing expert.

If the amount of cleaning is not very great, individual protection for the workers may be provided by means of gas masks. These should be of types approved by the Bureau of Mines for the specific conditions involved. Where the operator is provided with a mask, however, care should be taken that nearby workers are not exposed to solvent vapors, through lack of general ventilation. It may be desirable to carry out cleaning operations after regular working hours, so that only the protected operators are present.

In some cases natural ventilation, outdoors, or in a well-aired room, may be sufficient for small, occasional, cleaning operations. This procedure may not always be safe, however, since weather conditions are variable.

Workers on or near cleaning operations should be instructed to report promptly to the foreman any strong solvent odor. Symptoms of illness, such as nausea, dizziness, headache, stomach or visual disturbances, should immediately be reported to the plant physician or nurse, who must be kept informed of the solvents in use. Some individuals may show unusual sensitivity to solvent vapors, and should be removed from the vicinity of the cleaning operation at once.

Skin troubles may be caused by frequent or prolonged contact with solvents. Where it is not possible to avoid skin contact with solvents, skin difficulties may be prevented by providing workers with protective clothing or creams and good washing facilities.

The chlorinated solvents, such as trichlorethylene, carbon tetrachloride, and perchlorethylene, are not fire hazards, and may be used safely as long as proper ventilation is provided. The petroleum solvents, such as gasoline, benzine, and petroleum ether, on the other hand, are highly flammable, and require extra precautions. Specially designed ventilating equipment, non-sparking tools and shoes, and vapor-proof lights must be provided. Strict observance of "No Smoking" rules and suitable fire extinguishers, conveniently located, are important.

Certain solvent vapors may be corrosive, so that it is not advisable to keep fine machinery in the vicinity of cleaning operations unless there is an efficient ventilating system drawing off the vapors. Otherwise, the machinery should be covered, or the clean-up operation moved elsewhere.

Safety Research Institute

Equipment Notes

Bristol Co., Waterbury 91, Conn., has added a line of **hinged-type wire belt hooks,** known as Bristol's Belt Hooks, to its line of belt lacing products. The new hooks are designed for joining all types of flat belting, including rubber, balata, leather and fabric belts. Various sizes are offered to take care of belts up to three-eighths inches in thickness.

The **Master automatic electric glue pot,** with a capacity of two quarts, has been introduced by the Kindt-Collins Co., 12651 Elmwood Ave., Cleveland 11, Ohio. The feature of the pot is a thermostatically-controlled heating element that operates within a vacuum-sealed fluid which circulates between the outer and inner shells of the pot and transfers equal heat to all parts of the glue.

Increased industrial use of electronic recorders is said to have been made possible by stepping up chart speeds of **Electronik Pyro-Potentiometers** manufactured by the Brown Instrument Co., Philadelphia, Penna. The fast speed models, single or multiple point, will have internally mounted gears for speeds of 10, 20, 30 and 40 inches an hour.

Fire Control in the Manufacture of Synthetic Adhesives and Coating Compounds

By P. W. EBERHARDT

Manager, Industrial Sales Dept., Walter Kidde & Co., Inc., New York

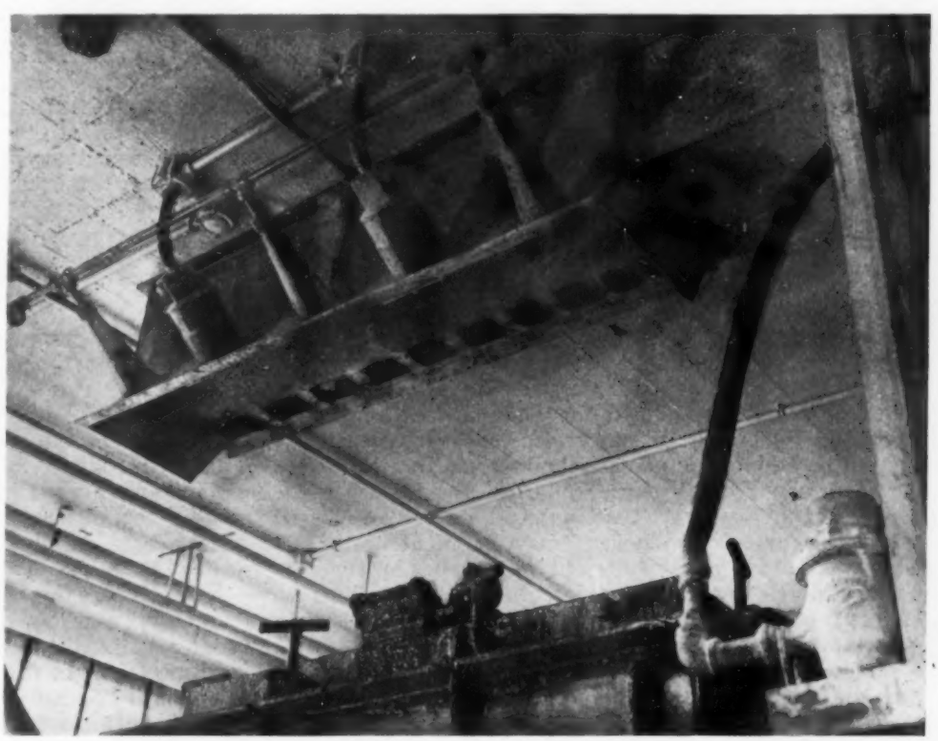
PLANTS which employ considerable quantities of solvents and other flammable liquids, such as those engaged in the manufacture of synthetic rubber compounds, are especially vulnerable to fire. The tremendously increased use of these hazardous substances has greatly magnified the already formidable problem of industrial fires; but fortunately comparable advances have been made in the field of fire-protection engineering, and specially designed installations employing the most suitable extinguishing agent are available to cut down the mounting toll.

An example of the way in which the fire problem is handled by foresighted firms is supplied by the Minnesota Mining and Manufacturing Company's plant in Detroit, where natural and synthetic rubber coatings and adhesives are made. Highly flammable solvents are used, so that the operation is decidedly hazardous from the fire-prevention point of view and has required careful planning of control measures.

In keeping with the modern principle of directing attention to the hazard rather than to the fire, Minnesota Mining safety engineers followed up careful appraisal of danger areas with the most suitable means of protecting them. In making present coatings and adhesives, synthetic rubber is first softened on an open mill with a hood and special apron. It is then put in a mixer and dry-mixed with resins, etc., after which the solvents are added. The finished cement or adhesive is poured out into drums.

Each mixer, with a capacity of about 10 barrels, is housed in a separate room, and each room is protected by its own high pressure carbon dioxide fire-extinguishing system, specially engineered for the premises by Walter Kidde & Company, Inc. Eight steel cylinders containing 50 pounds each of liquefied carbon dioxide, are manifolded together in a neat frame located outside the door of the room. Distributing pipes terminate in three shielded nozzles built into the cover of the mixer as a "local application" unit, and in other shielded nozzles for total flooding of the room, placed in this instance around the walls about half-way between floor and ceiling.

Heat detectors of the rate-of-temperature-rise fire detection device are located both on the ceiling and in the cover of the mixer, where heated air would strike. An abnormal rise of temperature resulting from a fire or overheated equipment would cause a wave of increased pressure to travel from the detector through its



Conventional automatic water sprinkler systems are supplemented by specially-engineered Kidde carbon dioxide systems in the mixer rooms of the Minnesota Mining plant in Detroit, some of the apparatus being installed in the mixers themselves. In this view, shielded discharge nozzles are seen above a mixer (shown in closed position). A circular heat detector is visible on the ceiling at the upper left. A similar detector is installed on the under side of the cover of the mixer.

Storage bank of Kidde cylinders at Minnesota Mining's Detroit plant. Protective sheet metal casing, ordinarily in place across upper third of frame, has been removed to show valves and manifolding.

tubing, automatically actuating the release mechanism and opening the control valves in the storage cylinders. Upon release the carbon dioxide rushes through the piping under its own stored pressure (850 lbs. per square inch at 70° F.), at a rate of about 200 feet per second, expanding 450 times its volume on discharge to the atmosphere at the shielded nozzles.

This discharge cuts down the percentage of oxygen in the atmosphere in less than 20 seconds to a point at which fire cannot exist. At the same time its passage through the piping serves to close fire-doors and ventilating louvers and shut off the ventilating system, by means of pressure trips and switches which are tied into the system. This isolates the scene of the fire, preventing fanning of the blaze or escape of the extinguishing gas. Thus a potentially dangerous fire can be automatically detected and extinguished a few seconds after its outbreak, and there are many instances on record where this has been accomplished so speedily that no trace of the fire has remained.

Carbon dioxide is non-toxic, but the principle by which it smothers fire—lowering of the ratio of oxygen in the air—also makes such air too low in oxygen to support breathing, and personnel must therefore vacate the room should fire occur. In order to provide opportunity for this before the extinguishing system discharges, a time-delay element may be incorporated. This is set at any interval desired by plant safety engineers, generally from 20 to 35 seconds, during which an alarm gong sounds continuously. The system then goes into operation and the gas is discharged.

Carbon dioxide, even though 50 per cent heavier than air, penetrates throughout the entire space due to its rapid expansion and delivery. The convection currents set up by the fire itself, also assist in complete dilution at all levels in the space. Its three-dimensional property allows it to flow around obstructions and to penetrate into the cracks and crevices which can provide a hideaway for flammable residues, so that all flame in the room is extinguished simultaneously. The gas is later entirely dissipated by ventilation, leaving materials uncontaminated and obviating any problems of clean-up or reclamation.

The Kidde system, fully automatic with emergency remote manual control, is self-contained, requiring no pumps or refrigerating units, and is not dependent upon water supply or outside electrical power. Its use of multiple high pressure storage units provides an additional safety factor, as possible leakage or damage to a single unit would not materially affect its efficiency. The amount of carbon dioxide incorporated in the installation is determined by the standards of the National Fire Protection Association.

As the gas does not freeze, corrode its mechanism, or deteriorate with age, it does not need to be replaced until used. Maintenance consists of periodic inspection to check on possible tampering, and weighing of the cylinders to determine their charge. The latter is a simple procedure, and can be accomplished without removing the cylinders from their frame.

The buildings of the Minnesota Mining & Manufacturing Company are also protected by an automatic sprinkler system, and by carbon dioxide wheeled extinguishers for emergency use wherever needed. This well-rounded out plan of fire protection has allowed uninterrupted production of vital war materials.

Coating compounds for Thiokol-impregnated gaskets, widely used in automotive trucks and tanks, are made at the Minnesota Mining plant. Another application for which the coating is being supplied is to line pressed fibre and plywood auxiliary and jettison gas tanks, forming a protective wall between the fuel and the fibre or plywood.

Coating compounds made by Minnesota Mining for adhesion to porous surfaces are produced in viscosities that can be sprayed, brushed or dipped. The heavier compounds are also called sealants and putties, the nomenclature depending primarily upon the application rather than on the nature of the compound itself. The principal uses for the sealants, as released for publication, are around grommets and fire bulkheads in single-engine planes to keep engine fumes out of the cockpit, and as a beading around 3M "Wetordry Safety Walk"—an abrasive coated cloth cemented to bomber wings as a non-skid catwalk. Sealing of the edges prevents oil, gas, water and fumes from attacking the adhesive.

Also manufactured at the Detroit plant are adhesives for bonding synthetics to metal, as in diaphragms around carburetors and booster pumps. The bond so formed is resistant to heat and aromatic fuels; however, adhesives in general do not have as good resistance to cold as do coatings and sealants. Another use for adhesives is in bonding Thiokol to itself without the necessity for curing. Such bonds have good resistance to gasoline and will maintain a high dead load.

Careful planning of fire protection measures for these hazardous operations has allowed uninterrupted production of the vital synthetics which play such a large part in war material today, and which it is expected will become increasingly familiar in the peacetime products to come.

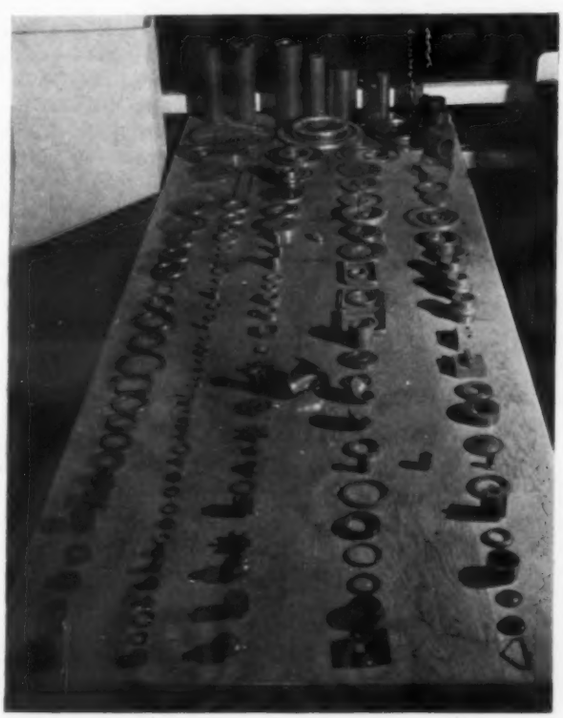
Small Emergency Production Unit Produces Repair Parts for Navy

By GEORGE W. GRUPP
Navy War Correspondent

IN these troublesome days the United States Navy never fails to use to the full its imagination, ingenuity and skill with care and with despatch to prevent needless loss of property and lives for the want of rubber parts, or for parts which can be substituted for those made of natural and synthetic rubber, for it recognizes that quick action is necessary in wartime, and especially when factory rubber part replacements must be transported for 9,000 miles to aid the United States Pacific Fleet.

For this reason, instead of waiting for some rubber parts to be shipped from the United States, a rubber project at a Pacific base, which consisted merely of a steel locker and vulcanizing machine in December, 1941, was expanded until today it is a small shop which consumes about 2000 pounds of natural rubber and approximately 4000 pounds of synthetic rubber daily, plus considerable quantities of compounding chemicals, to produce compounds out of which it makes about

One of the small mixers utilized by the navy for preparing miscellaneous rubber compounds.



Some of the 2,000-odd small rubber parts molded at the Navy's emergency rubber shop.

2000 different small rubber parts, from 40D to 70D in hardness. These parts range from pump impellers to valve seats, from flexible coupling bushings to plunger cups, from cylinder sleeves to manifold gaskets, from compass parts to submarine cable packing, from pressure oil seals to hose couplings.

The men who started this shop, and still run it, are not scientists but skilled mechanics who know how to use their natural gifts and powers of invention for useful purposes.

A lot of experimenting has been done in this shop, and yet there is nothing about its appearance that should cause one to think it is an experimental laboratory. Instead it looks like a compact, orderly arranged and operated engineering establishment, with sections devoted to the storage of raw materials, finished products and molds, to the processing of compounding and vulcanizing, and to the function of designing.

In the designing section young men are kept busy making drawings for new molds to fit special jobs. Naturally the types of molds, and the number of their cavities, are governed by the shapes and sizes of the proposed articles. Allowances are always made for shrinkage of the rubber parts during cooling. A complete case history, including detailed drawings, is kept on each mold—from the drawing board stage, through the Navy machine shop where it is made, in the rubber shop, and its final disposition.

To prevent the rubber parts from sticking, the molds

are usually first heated, and then they are brushed with either a soap solution or an especially prepared lubricant, or they are dusted with talc, plumbago, mica or powdered soapstone. From bitter experience the operators of this shop soon learned that when a scale of talc, soap, sulfur or dirt attaches itself to the molds the parts are not easy to remove from the molds. For this reason every precaution is taken to keep all molds perfectly clean. In fact, all molds are now carefully inspected for the presence of foreign matter before they are used.

Proper mixing, or compounding, is assured by giving the operators specific instructions on the work to be performed. Since only small amounts of rubber are compounded at one time to suit a particular urgent need, the operators are told the quantity and order of adding each ingredient, the time to add each ingredient, the time for each mixing operation, the total time to complete a compounding operation, the cooling time, and the working temperature of the mill rolls.

Compounding formulae and production methods are governed by the special resistance requirements of the needed parts to abrasion, to acids, to cold, to flex fatigue, to fats and oils, to flame, to gas, to heat and heat aging, to organic solvents, to oxidation, to ozone, to salt water, to steam and to sunlight.

No matter what demands are made of it this little Navy emergency rubber plant aims to serve well for it has three major objectives: (1) To make synthetic rubber parts which are better than natural rubber parts; (2) To make urgently needed special rubber parts which are required to repair marine engines, auxiliary machinery, gun turrets, compasses, and any other pieces of equipment aboard naval vessels which require small rubber parts; and (3) To do its part to help speed up ship repair and maintenance services at advance Pacific bases in order that the naval vessels in this part of the world may be returned to active duty at the earliest possible moment.

According to all reports, this little emergency rubber plant, located thousands of miles from the Pacific coast of the United States, is doing an outstanding small rubber parts job for the United States Pacific Fleet.

Review of Brazil's Research for Increased Rubber Production

IT IS Brazil's desire to regain her former prominent position as one of the important rubber-producing countries of the world. However, the methods that are used to extract the latex from the wild rubber trees of the jungles of the Amazon Valley and the processes for coagulating the rubber are much too primitive, slow and costly to compete with the newer methods and more highly developed and cultivated rubber trees of the Far East. Brazil has recently realized that the cultivation of rubber trees in the Amazon Valley is necessary toward the solution of the problem, but that before this could be done much research would have to be performed, because agricultural conditions in the Amazon Valley differ somewhat from those in the Far East

Research Institution Organized

A leaf disease very harmful to rubber trees is prevalent in South America and must be conquered before plantations can be successful. Brazil has many types of trees that give different types of rubber having different characteristics, and it was apparent that a physico-chemical research and testing laboratory would be necessary to evaluate all the various types of rubber. The Brazilian Government, therefore, established, in 1941, a research institution, called the Instituto Agronomico do Norte, near the city of Belem do Para, which is located in the rubber-growing area near the mouth of the Amazon River. The purpose of this institute is to study the problems of botany, pathology, physiology, entomology, technology and economics connected with all agricultural processes and products of the Amazon Valley. This, of course, includes problems connected with the production of rubber.

This institute, the I. A. N., has been working in close cooperation with the United States Department of Agriculture and the Bureau in the United States and also with the Ford Rubber Plantation in Brazil. A tree has been developed that will give a much greater yield of rubber than the average wild rubber tree of the jungle. This tree can also be made resistant to the leaf disease. It is produced by grafting a bud from a tree that is known to give a good yield of latex to one having a strong root system. This bud is added near the ground and forms the new trunk, the part of the tree that is tapped for latex. Then in order to give the tree good resistance to leaf disease, a third strain of tree that is not susceptible to the disease is added by top-budding at a height of 6 or 7 feet to form a new crown.

Plan Large Cultivating Program

With the development of this improved tree, the I. A. N. expects that the Brazilian Government will finance and begin the planting and cultivating of rubber trees in various sections of the Amazon Valley, and that later small acreages will be turned over to individual natives or families after they have been given sufficient instruction in the improved methods of rubber growing and processing.

With a good system of rubber research and technical schools established in the Amazon Valley, Brazil should be able to increase her rubber production and to compete favorably in price and quality with both the natural rubber of the Far East and the synthetic of the United States.

Method for Testing Static Conductive Rubber Belts

AN easy method to determine whether any rubber V-belt, flat belt, hose or other product is static conductive has been developed by technicians of the B. F. Goodrich Company, which was among the first to develop rubber compounds which conduct static. The company recommends that all static conductive rubber belts be tested for conductivity at regular intervals of at least once monthly.

Static conductive rubber belts have proved especially valuable in many phases of war work, particularly in operations where a static spark might set off a fire or explosion. They also will have many other peacetime uses, including belts for washing machines and other household appliances.

A simple assembly, using a five or six foot length of lamp cord with standard rubber socket plug, a two-watt Neon bulb, two ordinary clamps or metal prongs, and two insulated handles can be readily constructed for the tests. One of the wires of the cord is cut, the Neon bulb inserted in a standard base, the insulated handles installed near the end of each wire and the prongs or clamps attached to the wires.

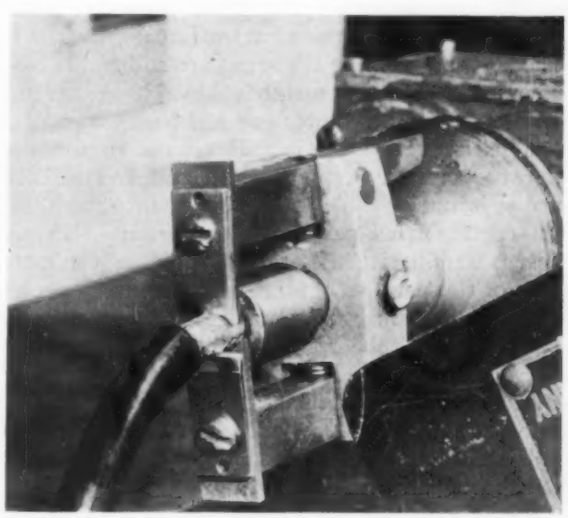
To make the test, part of the belt or other rubber product is moistened with water, leaving a dry section eight to twelve inches long between the moistened surfaces, the testing assembly is plugged into any 110 volt alternating current line, and the clamps or prongs applied to the moistened surfaces, with the dry in the middle. If the bulb glows, the rubber product is a static conductor.

Testing the static conductivity of a V-belt.

The belt or other article under test must be suspended in the air between the clamping points, or rest on a table or other surface which has been insulated so it is non-conducting.

Improvement in the Stripping of Co-Axial Cables

DEVELOPMENT of a metal adjustable stop which is used in conjunction with the cutting blades on a wire stripping machine for removing the shielding from co-axial cables is reported to have resulted in a considerable saving of scrap material at the Baltimore, Maryland, plant of the Glenn L. Martin Co.



Metal adjustable stop of the cable stripper.

In the method formerly used, the cable was placed in the cutting slot and the blades closed around the cable from the top and bottom until they cut through the insulation which could then be stripped off at the end of the wire. Chief problem was that since the cutting machine was used on many sizes of cables, the depths to which the blades were permitted to cut was more or less a matter of guesswork on the part of the operator. As a result, the cuts ofttimes were made too deep and the wire was sufficiently damaged as to make it unfit for installation purposes.

The new stop fixtures are now attached at the side of both the bottom and top blades of the stripping machines. They are designed with convex ends so that the edges of the fixture when closed form a circle around the cable and prevent the blades from cutting any deeper than necessary into the insulation. Making them adjustable and in various sizes permits many kinds and sizes of cables to be cut on the same machine using the same blades.

Before the new stops were added, scrap material on smaller cables sometimes ran over fifty per cent. Now the scrap loss is entirely eliminated. In addition they have resulted in a savings of approximately fifteen hundred man-hours per year in eliminating rework necessary before this time, and experiments are underway to determine if the same idea, with changes and modifications, can be applied to various other types of cutting processes.

Editorials. . . . . .

German Industry

AMONG the decisions reached at the Potsdam Conference was one which called for stripping Germany of her power ever again to lead the world into chaos. Under analysis this means accomplishing two major objectives: (1) Complete elimination by removal or destruction of certain basic industries, such as the synthetic rubber or the synthetic oil industries; and (2) Complete control over the balance of all heavy industry. Since the "Big Three" are agreed upon the necessity for obviating Germany's power to make war, it is certain that her heavy industry will be treated as outlined. Now the question remaining is which industries shall be eliminated and which permitted to continue under effective Allied control.

Despite the terrific bombings levelled at Germany's various synthetic rubber plants, it was quite apparent at the end of the war that the potential capacity of these plants—170,000 tons, although actual production never exceeded 110,000 tons a year—was never very seriously disrupted. An efficient stockpile of equipment parts enabled damaged plants to be quickly repaired and restored to production levels deemed satisfactory. One question facing the authorities then is: Shall the German synthetic rubber industry be removed, destroyed or permitted to continue operation under control?

There are those who argue that rubber, in any form, is basically a peacetime commodity, despite its essentiality to the conduct of mobile warfare. They point out that transportation is necessary to the efficient economy of any country and transportation cannot be provided without rubber. They argue that food, too, is a wartime necessity, but can any country survive without sufficient food at any time? On the other hand, there are those who maintain that any wartime commodity which can be controlled outside of Germany should be denied to the German manufacturing industry. In other words, making Germany totally dependent upon imports of rubber—natural and synthetic—cuts off one definite branch of the military tree. Permit Germany to manufacture finished rubber products by all means, but control the basic raw material so that one war potential is forever eliminated.

It makes sense. We recommend that Germany's synthetic rubber manufacturing facilities be either removed to the United States, England or Russia, if they can be usefully adopted by any one of those three countries, or destroy them completely. Since both the United States and Russia are the principal producers of synthetic rubber, and England would like to be included as such a producer if she could, the idea is attractive for economic as well as security reasons.

Segregating Scrap Rubber

THE strongest argument yet put forward for the necessity of properly marking all-synthetic or part-synthetic products at the source of manufacture and for properly segregating these products once they eventually reach scrap rubber circles is contained in the report on the over-all German rubber industry prepared by the staffs of the WPB Rubber Bureau and the Office of Rubber Reserve, which is being published in full in RUBBER AGE. The first part of this report, which will comprise four parts in all, appears in this issue.

Commenting on German reclaimed rubber, the report is specific in the statement that German reclaim is not equal in quality to American reclaim. No effort was made during the war years to keep crude and synthetic scrap tires separated at the reclaiming plants "since the synthetic tires had not been properly marked by the manufacturers." Because of lack of such marking and because of no attempts at segregation, the quality of German reclaim has deteriorated considerably. This deterioration, in fact, had proceeded so far, according to members of the American rubber technical mission who visited Germany to secure the facts, that "reclaim was not generally accepted for use in tires because of its low quality."

While considerable progress has been made in the United States with regard to properly identifying all-synthetic and part-synthetic rubber products, particularly tires, at the source of manufacture, satisfactory methods of segregating the scrap are still in the offing. Numerous plans and methods have been advanced, but no generally acceptable one has been adopted. In official circles emphasis is laid on the necessity for closer cooperation between scrap and reclaim fields. Since it is not possible to make reclaim satisfactorily from contaminated parts, it is imperative that scrap concerns familiarize themselves with the commercial grades of tire parts recognized and used by the reclaimers, and that grading and packing be done in such manner that natural rubber, synthetic and recap parts shall be segregated. The leading scrap rubber dealers in the industry have no difficulties along these lines, since they work hand in glove with the reclaimers, but the problem applies to the thousands of small dealers located throughout the country.

CURRENT NEWS OF THE MONTH

WILSON NAMED SPECIAL RUBBER DIRECTOR; CUT-BACKS IN TIRE PROGRAM ANNOUNCED

CONSIDERABLE activity in official circles affecting the over-all rubber manufacturing industry occurred in the past few weeks. These included several changes in key personnel in Washington, headed by the selection of Robert S. Wilson, vice-president and sales manager of the Goodyear Tire & Rubber Co., to succeed John L. Collyer, president of the B. F. Goodrich Co., as Special Director of Rubber Programs; announcement of the expected cut-backs in the heavy-duty tire program; additional changes in the rubber regulations to further safeguard the still dwindling stockpile of natural rubber and to permit the wider use of Butyl rubber; and some minor modifications of the permissable price structure for various types of finished rubber products.

The appointment of Mr. Wilson as Special Director of Rubber Programs to succeed Mr. Collyer came as no surprise since when Mr. Collyer took on the job it was with the understanding that it would not run beyond a three-month period. Actually, Mr. Collyer headed the Rubber Program for almost four full months. The selection of Mr. Wilson to succeed him had been made several weeks before the official announcement.

J. Edward Trainer, vice-president of the Firestone Tire & Rubber Co., who was called to Washington to assist Mr. Collyer shortly after the latter's appointment, has also retired from government service, and has returned to Firestone. George M. Tisdale, vice-president of the U. S. Rubber Co., has gone to Washington to act as special assistant to Mr. Wilson, the new director.

The appointment of Raymond T. Bete, development manager of the Kelly-Springfield Tire Co., to head the Tire and Tube Division of WPB's Rubber Bureau, was announced on July 24. He succeeds J. S. Johnson, who is returning to the U. S. Rubber Company in New York. At the same time it was announced that James W. Gilbert, who was Assistant Director of the Tire and Tube Division, has also resigned, and has returned to the Armstrong Rubber Co. Both Mr. Johnson and Mr. Gilbert will continue as part-time consultants to the Bureau.

Collyer Outlines Problems

In submitting his resignation as Special Director of Rubber Programs, Mr. Collyer issued a report covering the over-all rubber manufacturing situation and the components required therefor. He recommended that a Director of Rubber Programs be a continuing officer on the staff of J. A. Krug, Chairman of the War Production Board.

In his report, Mr. Collyer indicated that military and minimum essential civilian requirements for tires and other rubber products can be met during 1945 and 1946 through programs and policies now in effect. He listed nine problems of current and future importance which require constant study and attention if a proper balance is to be continued between the many complicated parts that comprise the rubber programs. These problems are:

1. Assisting industry in filling immediate and prospective manpower needs, for rubber products and component materials plants, to realize the heavy production schedules planned. It is of vital importance that all production equipment be kept in operation six full days a week, and, when necessary, seven.

2. Overcoming, as quickly as possible, the critical current shortage of large truck tires of the A-3a and A-3b size groups, for both military and essential civilian use.

3. Offsetting in every way possible the prospective natural rubber problem of 1946 by:

(a) Centering the attention of the appropriate military authorities on the necessity of gaining new rubber sources in the very near future.

(b) Working with proper U. S. A. government authorities to assist liberated territorial governments with supplies for gathering and preparing rubber for shipment.

(c) Following up on installations of washing and drying equipment to insure having enough rubber, in usable condition, on time.

4. Insuring against fall-downs on rayon production schedules or delays in construction of rayon expansion projects.

5. Continuing to study component materials requirements and supplies, so that possible bottlenecks may be foreseen and acted upon before they become serious.

6. Continuing to work cooperatively with claimant agencies in the estimation of rubber production requirements, so that balance can be maintained.

7. Expediting construction of large tire, carbon black, synthetic rubber, rayon, guayule, and rubber washing plants now under way.

8. Maintaining the improved, but minimum, essential civilian tire position established for the third quarter of 1945.

9. Above all, maintaining a strong government rubber organization, equipped with the experience, standing, and authority necessary to cope successfully with the complicated rubber problems.

Reviews Current Situation

The report submitted by Mr. Collyer disclosed that consumption of rubber in the United States in the first six months of the current year reached an all-time peak of 433,806 long tons. Consumption of both natural and synthetic rubber in the first quarter of the year was set at 221,806 tons and approximately 212,000 tons for the second quarter, with June consumption estimated. This consumption rate averages approximately 870,000 tons a year.

Pointing out that a production objective of 15,000,000 passenger tires was set for the last six months of this year, the report states that output reached 6,368,000 in the final quarter of 1944, but because of emphasis on truck tires combined with component shortages only 5,056,000 units were made in the first quarter of 1945. If the 15,000,000 schedule is met, it will provide a total of 25,000,000 passenger tires this year, as compared with a total of 18,900,000 in 1944. Essential replacement requirements are set at 20,000,000 units for 1945 and 22,000,000 units for 1946. Production of farm tractor and implement tires is expected to reach 2,300,000 units this year.

Conversion of rubber products from the standpoint of synthetic rubber use has been so successful, according to the report, that synthetics accounted for approximately 86% of total consumption in the first six months of the current year. Use of natural rubber, however, is still in excess of imports and it is estimated that only 66,000 tons will remain in the stockpile by the end of the year. Thus, the report points out, natural rubber constitutes the most serious single obstacle to the attainment of 1946 production objectives.

(EDITOR'S NOTE: The belief that some 200,000 tons of natural rubber will be "liberated" soon in the Far East was expressed by executives of leading rubber companies at a press conference in Washington on July 31. Latest information was said to indicate that large stores of natural rubber ready for shipment

will be found in French Indo-China, Siam, Sumatra and Borneo. In other quarters it is claimed that the need for large quantities of natural rubber is partially dictating military moves in the Pacific area.)

Other components are in fairly good supply. Production of carbon black, for example, the shortage of which a few months back led to drastic curtailment of its use, increased from 69,200,000 pounds in February to approximately 99,300,000 pounds by the end of June, an increase of 43%. When all of the new plants now under construction have reached full operating levels, it is estimated that monthly production of rubber types of carbon black will reach 122,000,000 pounds, which is sufficient to provide for all estimated U. S. A. needs and approximately 17,000,000 pounds a month for export. The textile position is still tight in spots, with manpower being the primary difficulty.

(Editor's Note: WPB estimated on July 30 that production of carbon black for July reached 102,800,000 pounds, with requirements for the month totaling 101,400,000 pounds. Carbon black production in August, as estimated by producers, will be 101,900,000 pounds, as against 95,100,000 pound demand from the industry. The necessity of substituting one type of black for another, because of lack of supply of specific types, is decreasing monthly, and will probably be eliminated in the next few months, according to the government agency.)

Manpower in general still remains one of the most serious problems facing the rubber industry. The problem, as outlined by Mr. Collyer, breaks down into three phases: (1) Getting the required number of physically qualified workers; (2) Keeping the workers on the job through major reductions in absenteeism and work stoppage losses; and (3) Producing more product per unit of equipment and per man per day. As of June 9, a total of 8,606 workers were needed for truck tire and major components production, 4,300 of them for the production of truck and bus tires, and 4,306 for the manufacture of reclaimed rubber, rayon, cotton cord and chafer fabric.

Cut-Backs in Tire Program

The anticipated cut-backs in the overall tire expansion program, including production facilities for the manufacture of tires, tubes and bogie wheels, were announced within recent weeks. On July 20, W. James Sears, Deputy Director of the Rubber Bureau, announced that 12 government-authorized expansion projects for large truck tires, completion of which would have cost $86,000,000, have been cancelled. Of these 12, six were new building projects and six were projects involving additional buildings and equipment.

The six new building projects cancelled were those to be operated by the following companies, the location being indicated in parentheses: Lee Rubber (Kansas City, Kansas), Inland Rubber (Ottawa, Ill.), Kelly-Springfield (Houston), Goodyear (Nashville), Goodrich (Tuscaloosa, Ala.), and Firestone (Pottstown, Penna.). Those involving additional buildings and equipment were Firestone (Los Angeles), U. S. Rubber (Detroit and Eau Claire, Wisc.), Mansfield Tire (Mansfield, Ohio), Goodyear (Gadsden, Ala.) and General Tire (Waco, Texas).

At the same time Mr. Sears revealed the earlier cancellation of 25 expansions for making smaller truck tires, many of these being partial cut-backs in the same projects included in the group of 12 listed above which were fully cancelled, and some being expansions of existing buildings. These cancellations are listed below:

Agent	*% of Cancellation to Entire Project*	*Location*
Goodyear	100.0	Akron, Ohio
Mohawk Rubber	100.0	Chattanooga, Tenn.
Dayton Rubber	64.2	Dayton, Ohio
Denman Tire	61.6	Warren, Ohio
Pennsylvania Rubber	60.8	Jeannette, Pa.
Firestone	55.6	Memphis, Tenn.
Seiberling	50.1	Barberton, Ohio
Firestone	46.9	Los Angeles, Calif.
U. S. Rubber	45.0	Detroit, Mich.
Armstrong Tire	43.9	Natchez, Miss.
Master Tire	43.5	Findlay, Ohio
Goodyear	41.2	Topeka, Kan.
Mansfield Tire	40.2	Mansfield, Ohio
Armstrong Rubber	39.0	West Haven, Conn.
Goodrich	39.0	Tuscaloosa, Ala.
Norwalk Tire	36.7	Norwalk, Conn.
Pacific Rubber	28.5	Oakland, Calif.
Firestone	23.5	Pottstown, Pa.
Kelly-Springfield	21.6	Houston, Texas
Lee Rubber	20.3	Kansas City, Kan.
Pharis Tire	18.1	Newark, Ohio
General Tire	16.3	Akron, Ohio and Waco, Texas
Lee Rubber	12.7	Conshohocken, Pa.
Lake Shore Tire	10.5	Des Moines, Iowa
Firestone	1.3	Akron, Ohio

Five bogie tire expansions have also been cancelled, the companies involved and the locations being: Firestone (Akron and Pottstown, Pa.), Dayton Rubber (Dayton), U. S. Rubber (Detroit) and Goodyear (Nashville).

Earlier, on July 16, the Rubber Bureau announced cancellation of 21 plant expansion projects for the manufacture of truck tire tubes, which if completed would have cost $11,000,000. All of these were expansions authorized by the government. These cancellations and locations included: Goodyear (Topeka, Kan., Gadsden, Ala., and Nashville), Lee Rubber (Conshohocken, Pa., and Kansas City, Kansas), Master Tire (Findlay, Ohio), Norwalk Tire (Norwalk, Conn.), Pennsylvania Rubber (Jeannette, Pa.), Armstrong Tire (Natchez, Miss.), Dayton Rubber (Dayton), General Tire (Akron and Waco, Texas), Mansfield Tire (Mansfield, Ohio), Oliver Tire (Emeryville, Calif.), Robbins Tire (Tuscaloosa, Ala.), Seiberling (Akron), U. S. Rubber (Eau Claire, Wisc., and Chicopee Falls, Mass.), Firestone (Pottstown, Pa.), Goodrich (Tuscaloosa, Ala.), Inland Rubber (Ottawa, Ill.), Kelly-Springfield (Houston) and Carlisle Tire (Carlisle, Pa.).

In addition, government-authorized expansions for the manufacture of tire flaps and air curing bags were cancelled at plants of Firestone at Pottstown, Penna., and Textile Rubber at Bowden, Georgia.

Cancellation of the large and small truck tire, bogie wheel and truck tube facilities amounts to a total of $110,000,000 of cancelled plant expansions. The total cost of truck tire expansions approved in December, 1944, and January, 1945, amounted to $132,000,000.

In explaining the cut-backs, Mr. Sears made it clear that requirements at the time of approved expansion indicated a need for 24,000,000 truck tires per year. The subsequent demand of the stepped-up two-front war at the beginning of 1945 increased this requirement to 28,000,000 tires per year. Revisions and cut-backs made possible since V-E Day reduced the figure to 20,000,000 tires, and the expansion program has been adjusted to this production rate.

Mr. Sears also stated that it is impossible at this time to determine the net saving to the government involved in these cancellations because there are termination negotiations in every instance. He indicated, however, that equipment on government orders will probably be disposed of to industry without substantial loss.

Expansion Projects Retained

According to a statement issued by Mr. Sears on July 31, military truck tire expansion projects being retained, because they are closest to completion, will add 2,000,000 heavy-duty tires to the annual capacity of the industry. Construction of 13 projects involving approximately $20,000,000 of government funds is continuing and, in addition, six expansions that involve only private funds are being completed.

Of the 13 expansions in which government funds are involved, all except one have had partial cancellations. The exception is the McCreary Tire & Rubber Co. of Indiana, Pa. The other 12, in which only expanded capacity for large truck tires is retained, are: Firestone (Akron and Memphis), Mansfield Tire (Mansfield), Armstrong Rubber (West Haven, Conn.), Armstrong Tire (Natchez, Miss.), Lake Shore Tire (Des Moines), Pacific Tire (Oakland, Calif.), Pharis Tire (Newark, Ohio), Goodyear (Topeka, Kansas), Master Tire (Findlay, Ohio), Norwalk Tire (Norwalk, Conn.) and Seiberling (Akron).

Of the six projects involving only private funds that are being continued in the government program, the plant of U. S. Rubber at Los Angeles has had no partial cancellation. The others, all of which have had partial cancellations, include: U. S. Rubber (Chicopee Falls, Mass. and Eau Claire, Wisc.), Pennsylvania Rubber (Jeannette, Pa.), Lee Rubber (Conshohocken, Pa.) and Dayton Rubber (Dayton).

Changes in Rubber Order

Under the terms of Amendement No. 2 to Appendix I of Rubber Order R-1, as Amended May 30, 1945, issued on

STATEX

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MANUFACTURER

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Statex-93 provides a factor of safety in the reinforcement of GR-S treads. Road service has demonstrated that while wearing qualities of small sizes is improved by blending in channel black, the same procedure in heavy duty tires too often results in premature failures through cracking or separation. For full security use straight Statex-93 in the treads of heavy duty truck tires designed for high speed service.

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July 28, military gas masks and industrial safety masks may now be made with Butyl rubber or with neoprene. Butyl rubber that does not meet specifications for tire tubes may also be used for waterproofing and other proofing, coating and combining of fabric. Additional changes covered by this amendment clarify and simplify sections dealing with the manufacture of mechanical goods.

Several changes have also been made in Appendix II of the rubber order, four new amendments to this appendix having been issued in recent weeks, as follows:

Amendment No. 3, issued on July 14, provides for the increased use of synthetic rubber in certain airplane tires, including military tires, which is expected to provide a saving of 125 long tons of natural rubber a year, based on present production schedules.

Amendment No. 4, issued on July 14, lifts restrictions on the manufacture of Grade A camelback. Such camelback, the production of which had been restricted to crown widths of greater than 5½ inches, may now be manufactured in all sizes. The improved supply of carbon black is responsible for this decision.

Amendment Nos. 5 and 6, issued on July 21, permit the use of rayon tire cord in the production of five smaller sizes of truck tires for which only cotton tire cord had previously been authorized. The tire sizes affected are 7.50, six and eight-ply, all rim diameters, highway tread. This action was made possible in part by an increase in the production of rayon tire cord and in part because of reduced requirements for military tires. The synthetic construction of 7.50x16, eight-ply highway tires has been changed from S-6, which permitted the use of 30% natural and 70% synthetic rubber, to S-4, in which only 10% of natural rubber may be used. These changes are expected to save 350 long tons of natural rubber a year.

In addition to the above, a minor change in the method of acquisition of tires and tubes for original equipment was made on July 20 in Amendment No. 2 to Rubber Order R-1, as Amended May 30, 1945. Under the original certificate required from manufacturers they were required to attest that "the deliveries specified will not result at any time in an inventory exceeding 30 days' supply based upon his total authorized monthly production." The amendment changes this wording to read "in an inventory greater than required for his scheduled production in the ensuing thirty days."

Reduce Tire Reliner Prices

A 20 per cent discount for tire reliners, patches and boots made from scrap material when they are sold by manufacturers to jobbers, mail order houses and chain stores with more than 25 establishments, is provided by Amendment 3 to R.M.P.R. 131 (Camelback and Tire and Tube Repair Materials), issued on August 8 and effective August 13. The dollar-and-cent prices listed for these items continue in effect on sales to retailers and chain stores having 25 establishments or less.

When the action, effective March 27, 1945, establishing only one level of maximum prices for all wholesale sellers was issued, manufacturers assured OPA that they would continue their customary differential to jobbers, chain stores and mail order houses. In the majority of cases differentials were not maintained and jobbers were forced to buy at such high prices that they either could make no profit or had to stop handling the items, OPA said.

Other changes made by the new action in the camelback and tire and tube repair material regulation are as follows:

An individual pricing adjustment provision is added to the regulation for manufacturers of reliners, patches and boots where hardship exists. Such manufacturers are to file applications for adjustment with the national OPA office. The application should contain profit and loss statements for the years 1936-39 and the most recent complete fiscal year, departmental costs or total unit costs, and proportion of applicant's sales of reliners, patches and boots to his total sales during the most recent complete fiscal period.

Manufacturers' prices for gum covered crisscross patches, double cushion patches and fuel cell patches made from scrap materials are removed from the specified dollar-and-cent prices listed in the regulation. Prices for such patches will be established by application to OPA in order to allow for the extra cost often involved in their production.

All manufacturers of tire reliners made from new materials are to apply to OPA for their prices. Previously, manufacturers used their March, 1942, prices, which were high because of the great demand for reliners at that time. By having manufacturers apply for prices for tire reliners made from new materials, OPA can set prices that are in line with the prices established March 27, 1945, for reliners made from scrap materials.

A maximum price of one cent per pound for defective camelback and repair materials covered by the regulation is established by the action. (Such materials when sold to industrial consumers are covered by Revised Price Schedule 87.) Previously, only a maximum price for defective reliners, patches and boots made from scrap materials was included in the regulation.

Miscellaneous Regulations

Reductions ranging from 5 to 20 cents a pound in most manufacturers' ceiling prices for neoprene bare cut rubber thread are contained in Amendement No. 18 to M.P.R. 149 (Mechanical Rubber Goods), issued by OPA on July 31. Uniform dollar-and-cent ceilings, ranging from $1.15 to $3.50 a pound, are now established for the entire industry, replacing varying ceilings for individual manufacturers. These reductions will shortly be reflected in corresponding reductions in the ceiling prices established for manufacturers' sales of elastic webbing, braid and cord.

Exemption from price control on all resales of rubber-coated fabric patches originally purchased by the Army for use in repairing gas masks has been granted in Order 71 to Supplementary

R. S. WILSON—NATIONAL RUBBER DIRECTOR

R. S. Wilson, who succeeded John L. Collyer as Special Rubber Director on July 18, is vice-president and sales manager of the Goodyear Tire & Rubber Co. His sales experience covers a continuous period of 33 years during which he has been with Goodyear. After graduating from Princeton in 1910, he served for two years as a member of the faculty of Lawrenceville Academy and then joined Goodyear's tire service department in 1912, soon becoming its manager. In 1917 he was named manager of truck tire sales, and four years later was named divisional sales manager for the territory west of Chicago and east of the Rockies. He served a year as advertising manager before being elected vice-president and sales manager in 1928. Mr. Wilson has wide experience in the selling and merchandising of automotive and mechanical rubber goods, as well as shoe products, packaging, etc.

Order 94. The patches are 7/8ths of an inch wide by 1¼ inches long, with linen adhesion protector. Some 720,000 of these patches have already been disposed of by the Surplus Property Board.

The following ceiling prices have been established by OPA on used Navy life belts: sales to wholesalers, 85c; sales at wholesale, $1.10; sales at retail, $1.65. These ceilings are in addition to those previously established on new Navy life belts, the latter being $1.31, $1.75, and $3.15, respectively.

M.P.R. 200 (Rubber Heels and Soles in the Shoe Repair Trade) was issued in revised form, including Amendment Nos. 1 to 21, on July 30. Amendment No. 21, which occasioned the revision, provided ceilings on ski shoe heels and mocassin soles. It also corrected the spelling of some trade names and made some minor changes in price listings.

Direction 21 to Order M-328, which consolidates regulations covering the production of rayon and cotton tire cord and which replaces the specific letters of direction and other rules under which producers of such cord have operated since 1943, was issued by WPB on August 7. The new regulation limits producers of cotton and synthetic fiber tire and aircraft fuel cell cord to the number of twister spindles operating on tire cord on March 31 or thereafter and specifies that no deliveries can be made except on rated orders. The new order also establishes procedure by which tire cord can be secured for such products as fuel hose, V-belts, flat belts, and repair materials for tires.

Additional official moves of interest to the rubber industry included the following: Silica aerogel has been placed under the control of Schedule 114 of M-300, the general chemicals allocation order; all restrictions on the use of lead chemicals for rubber compounding have been removed by an amendment to Conservation Order M-384; ultramarine blue, paraffin wax, pine tar, urea and melamine aldehyde molding compounds, and urea and melamine aldehyde resins, except those used for protective coatings, and vulcanized fiber tubing have been removed from the direct allocation control of M-300 and transferred to Order M-340, the miscellaneous chemicals order.

Rubber Reserve Co. Dissolved

In accordance with the Joint Resolution approved on June 30 (Public Law 109, 79th Congress), the Rubber Reserve Co. has been dissolved, as of July 1, 1945, and all of its functions transferred to the Reconstruction Finance Corporation, of which it was a subsidiary. All of the business formerly conducted by the Rubber Reserve Co. will henceforth be conducted by the newly-established Office of Rubber Reserve of the Reconstruction Finance Corporation. Richard Baybutt, who was a vice-president of the former company, is Deputy Director of the Office of Rubber Reserve.

All correspondence pertaining to the business formerly conducted by the Rubber Reserve Co. should be addressed in the future to the "Office of Rubber Reserve, Reconstruction Finance Corp., Washington 25, D. C.," and all checks submitted in payment for rubber should be made payable to the "Reconstruction Finance Corporation." The take-over does not effect any substantive changes in the established rubber distribution procedure and the same procedure should be followed, the same forms used, etc.

Coincident with the described change in corporate designation, the new Office of Rubber Reserve has prepared a new "General Sales and Distribution Circular." The new circular, copies of which are available on request to Washington, sets forth the procedure for the sale and distribution of both natural and synthetic rubbers, and supersedes all previous circulars issued by the Rubber Reserve Co. The new circular consists principally of a consolidation of the subject matter previously contained in the Rubber Reserve Co. circulars, with all obsolete subjects having been eliminated.

New Forms of "Purchase Permits" are now being prepared and will be put into use as soon as possible. The new forms will reflect changes in style, but will not involve any basic changes in procedure.

OPA TAKING STEPS TO ELIMINATE THE BLACK MARKET IN TIRES

Old R-2 tire purchase certificates, which local War Price and Rationing Boards stopped issuing June 5, 1945, will be removed from the rationing system to protect the nation's limited tire supply from the black market, the Office of Price Administration announced on July 20. Consumers will have until August 15 to buy tires with the R-2 certificates they now have. The new certificates, R-2A and R-2B, are not affected and will remain valid.

The agency explained that the circulation of large numbers of counterfeit R-2 certificates and printer rejects in some regions has been uncovered by OPA enforcement agents and at verification centers, where all tire certificates are screened. In order to save tires for eligible buyers, the R-2 certificates, which may be duplicated easily, will be taken out of circulation as soon as possible without penalizing consumers and dealers.

This will be done by giving consumers through August 15 to use their legally acquired R-2 certificates. After that date, old R-2 certificates will no longer be valid for consumer use. An eligible consumer holding an invalidated certificate may obtain a new tire then only by reapplying to his local board and following the same procedure as a new applicant.

Only a limited number of legally issued R-2 certificates is still held by consumers, OPA said. Since June 5, boards have been issuing only R-2A certificates, the "A" and "B" portions of which are identified by a wide blue stripe extending from top to bottom near the center of the form, and R-2B certificates, which are printed on safety paper. Since consumers have through August 15 to use any R-2 certificates that they still hold in buying tires from their dealers, they will not be inconvenienced if they use their certificates promptly.

Dealers will have an additional 15 days —through August 31—to transfer to their suppliers any R-2 certificates that they accept from tire buyers before August 16. Any certificates held by dealers on and after August 31 cannot be used for replacement of tire stocks. Dealers should turn in to their suppliers the old R-2 certificates that are included in their accountable inventory so that the certificates will be received by the latter not later than August 31.

However, as a further safeguard against the reduction of dealers' accountable inventories by the invalidation of the old certificates, the dealers will be permitted during September to exchange those certificates on hand September 1 for new valid certificates at their OPA district offices. This will prevent any dealer from suffering a certificate inventory loss.

The change will limit valid certificates in the future to those that can be protected against counterfeiting and so will prevent this type of tire loss to the black market. An amendment providing for this change will be issued soon.

Tire Quotas for August

Tire quotas for August, announced by OPA on July 26, left the quota for passenger and motorcycle tires unchanged from July at 2,500,000 units. Practically all other quotas, however, were reduced. The quota for bus and truck tires, size 7.50 or smaller, was left unchanged at 386,862 units, but the quota for size 8.25 or larger was reduced from 234,308 to 200,000 units. Of the tractor and implement type tires, the quota for size 7.50 or smaller was reduced from 70,000 to 60,000 units, and sizes larger than 7.50 from 40,000 to 35,000.

OPA pointed out that the August quota of 2,500,000 passenger and motorcycle tires was provided only by reducing present low inventories by another 500,000 tires. Even though production will be 500,000 tires below the quota, the July allocation was repeated to meet heavy summer demands. In addition, passenger tire backlogs—approved applications in local boards for tires that exceeded quotas and so could not be filled—were about 420,000 at the end of June.

The reduction of 34,000 in the large truck tire quota is particularly serious,

especially since August is the month of heaviest demand for such tires. Present inventories are so small, however, that it was not deemed advisable to borrow from them. The quota is in line with the number of tires actually available out of production for civilian delivery. The production of both large and small truck tires was seriously reduced by the recent strikes in Akron, but fortunately production of passenger tires was not greatly affected.

Amendments to Ration Order

Two additional amendments to Ration Order R-1 (Tires, Tubes, Recapping and Camelback) have been issued since our last report, as follows:

Amendment No. 101, issued July 16 and effective July 21, provides that passenger car owners using their automobiles for a bona fide change of residence for which they were issued special gasoline rations are eligible for Grade I passenger tire purchase certificates, subject to quota and other restrictions. This action will enable such persons to apply for new tires if they have a tire failure while making a permanent change of address, such as war workers moving from one city to another.

Amendment No. 102, issued on July 24 and effective July 28, states that distributors of tires who perform the distributing function of a "factory branch", even though dealer-owned, may be granted additional tire certificates. Requirements which must be met in order to qualify for an additional allotment are listed in the amendment.

Prices on Airplane Tires

Dollar-and-cent ceilings have been established by OPA for sales by the Office of Surplus Property of 10,857 used airplane tires declared surplus by the Army Air Forces. The ceilings, which apply only to this particular lot of tires, are incorporated in Order No. 69 to Supplementary Order 94. They range from $1.09 each for small size tires to $25.10 each for the largest airplane tires used, those on the B-29 superfortresses.

Order No. 53 of R.M.P.R. 528 (Tires and Tubes, Recapping and Repairing, and Certain Repair Materials), effective August 2, establishes wholesale and retail dollar-and-cent ceiling prices for 14 sizes of used airplane tires, including recapping and repairing service charges. These tires, declared surplus by the Army Air Forces, are to be converted for use on ground vehicles, mainly for farm equipment.

Murray on Spare Tires

According to Senator James E. Murray, of Montana, the Senate Small Business Committee has received numerous complaints to the effect that WPB is planning to equip new automobiles with five tires, including a spare tire, prior to the time that holders of "A" ration books have an opportunity to re-equip their cars.

In this connection, Senator Murray emphatically stated that it is the intention of the Committee to make certain that the new automobiles now coming off the assembly lines will not be equipped with spare tires until all automobile owners secure units to replace their tires "which are rapidly being worn out."

The Senator also stated that he had instructed the Senate Small Business Committee to maintain a constant watch on the situation to make certain that the provisions of WPB Order L-2,g, which limits to four the number of tires for new cars, are followed until such time as "A" ration book holders have access to available stocks.

Form Industry Inventions, Inc.

Industry Inventions, Inc., has been jointly organized by the B. F. Goodrich Co. and the Firestone Tire & Rubber Co., to handle the licensing of rubber and other firms under the Leduc and Dufour high frequency electronic vulcanization patents, the rights to which the companies jointly secured recently. V. L. Smithers, head of the Akron laboratories bearing his name, is vice-president and general manager of the new company, which will have its headquarters in Akron. Other officers include W. F. Avery, chairman of the board; W. A. Fraser, president; H. S. Woodruff, secretary; E. H. Schulenberg, treasurer; and M. J. Moyer, assistant secretary. Industry Inventions, Inc., will have no manufacturing facilities, but will maintain a large sales and technical staff.

Farm Tire Deficit Cut Sharply

Production at record levels of farm tractor and implement tires in the last 18 months has virtually wiped out a two-year deficit in supply created by the war, Robert S. Wilson, Special Director of Rubber Programs, recently stated, when WPB released estimates of civilian needs for farm tires. The rubber industry produced 1,103,361 of these tires in the first six months of this year, Mr. Wilson said. This is at a rate higher than the peacetime peak of 1941, when 2,072,500 units were shipped by the industry in the full year. Present schedules call for the production of 2,241,100 for the year 1945 and 2,699,400 in 1946, Mr. Wilson revealed.

U. S. Rubber Aided Bomb

The U. S. Rubber Co. has reported that it supplied large quantities of materials used in the production of the atomic bomb. The company stated that the War Department would not permit disclosure of which materials were supplied or where they were produced, but revealed that most of the work on the secret project was done between July and October of 1944.

FORMER PRISONERS OF JAPS RESTORE GOODYEAR PLANTATION

The Goodyear Tire & Rubber Co., Akron, has announced that the restoration and management of its plantation on Mindanao Island in the Philippines will be undertaken by two erstwhile Japanese prisoners recently released by the American Army. The former prisoners, Joseph C. Huber, who was manager, and N. H. Lundberg, who served as assistant manager, will be back at their pre-war posts within the next two months.

When the Japanese overran Mindanao Island, Mr. Huber was captured and imprisoned for three years with his wife and three children. Mr. Lundberg was a prisoner of the Japanese for the same period. They were freed last February when American forces recaptured Manila. Since then, they have been recuperating in this country from malnutrition and a tropical disease.

Originally capable of producing about 2,000 long tons of natural rubber per year, Goodyear's Pathfinder plantation is in better condition than was expected after three years of Japanese occupation, according to J. J. Blandin, manager of the Goodyear rubber plantations and of natural rubber purchasing, who also disclosed the contents of a report from a recent visitor to the site.

The report was made by Walter E. Klippert of the Goodyear Rubber Plantation Corporation, assigned by the Rubber Development Corporation last April to make the survey. He was accompanied by L. O. Figland, who remained on the Pathfinder estate to supervise the rehabilitation program. A member of the plantation staff, Mr. Figland barely escaped capture by the Japanese in 1942.

Mr. Klippert disclosed in his report that some of the rubber tree groves on the Pathfinder Estate were damaged by shell-fire, that seedlings planted shortly before Pearl Harbor had perished, and that manufacturing and processing facilities had been destroyed. However, it was said, new processing equipment is en route to the plantation while construction of new buildings has been started.

Using makeshift facilities, Filipino employees of the plant before the Japanese occupation secretly processed enough latex for about 43 tons of natural rubber which is now en route to this country.

Goodyear executives emphasized that restoration of the Pathfinder Estate will provide a mere "drop in the bucket," compared to actual natural rubber needs. Ninety per cent of this country's prewar natural rubber acreage is still in enemy hands.

The Grasselli Chemicals Department of DuPont has announced a price reduction of 10c per 100 pounds on iron-free alum in bags, carload lots. The new price of $1.75 is accompanied by a corresponding decrease in prices of small sales units. Iron-free alum is important, in the form of aluminum stearate, to the rubber and petroleum industries.

MINES BUREAU SURVEYS CARBON BLACK PRODUCTION

The total productive capacity of the carbon black industry in the United States at the end of the current year will probably reach 1,450,000,000 pounds per year, of which some 200,000,000 pounds will represent government-owned channel black plant facilities, according to a report on the current and postwar outlook for carbon black recently issued by the U. S. Bureau of Mines, Washington, D. C. The report was prepared by F. S. Lott, Petroleum Economics Division, Economics and Statistics Branch. Abstracts of the report follow:

The annual world absorption of natural rubber in the period 1936-40 averaged almost 1.1 million long tons, of which the United States took 60% in 1940. Sales of carbon black in this period by United States manufacturers, to rubber companies and for export, averaged approximately 415 pounds per ton of rubber absorbed. As recent practice has been to add more carbon black per ton of natural rubber compounded, an average of 460 pounds per ton (the 1939-40 experience) is considered more representative of present and prospective conditions.

A number of estimates of postwar world rubber consumption have been published which indicate that about 1.5 million long tons per year will be used, exclusive of reclaimed rubber. This quantity approximates a projection of the long term trend in rubber consumption, and therefore assumes a continuation of growth at a rate comparable to the average in the 1925-1940 period.

In order to estimate the amount of carbon black to be used with rubber, some measure of the proportion of synthetic to natural types that may be compounded is necessary. Although it is recognized that a high factor of error is inherent in any forecast of the synthetic rubber industry, the following assumptions appear reasonable on the basis of fragmentary information at present available. In making them, emphasis has been placed upon the probable economic and strategic position of synthetics.

No attempt is made to appraise variants that may be introduced by future national or international policies. In the first year following liberation of the rubber-producing areas, consumption of about 800,000 tons of synthetic rubber is probable, the total declining in the following 4 years to a rate of about 400,000 tons, to average 600,000 tons for the period.

With the use of 950 pounds of carbon black per long ton of synthetic rubber and 460 pounds per ton of natural, the demand for black in rubber (including 100 million pounds yearly estimated for use in reclaimed) would be 1,182 million pounds in the first postwar year and average 1,084 million pounds in the 5-year period. To the extent that foreign production of carbon black increases, the demand from United States sources will be lessened.

Coming Events

Sept. 13. Detroit Rubber & Plastics Group, Detroit-Leland Hotel, Detroit, Mich.

Sept. 21. N. Y. Rubber Group, Building Trades Club, New York City.

Sept. 28. Philadelphia Rubber Group, First Annual Outing, Oak Terrace Golf Club, Ambler, Penna.

On the other hand, a larger consumption of rubber than is projected above would require more carbon black. It must be emphasized that the potential influence of technical advances and Governmental policy upon future events in this industry is very great and inscrutable.

It is estimated that consumption of carbon black for purposes other than rubber compounding will average 56 million pounds per year trending upward from about 52 million in the first postwar year.

An average annual consumption of carbon black for all purposes of 1,140 million pounds is thus indicated for the 5 years succeeding the war, about 1,234 million pounds being needed in the first year and smaller amounts thereafter as more natural rubber enters the trade.

It is anticipated that the total productive capacity of the carbon-black industry in the United States at the end of 1945 may reach 1,450 million pounds per year, of which about 200 million pounds will represent Government-owned channel-plant facilities. An additional indeterminate portion of total capacity will fall into the emergency high-cost category, supplying the swollen demands of war but destined to cease production upon the return of normal competitive conditions. The ultimate disposition of the Government plants will of course affect the trade position of commercial plants. Of greater moment, however, to the delineation of the postwar economic climate within the industry will be the extent of direct competition between blacks of the channel and furnace types.

Information currently available indicates that the return to large use of natural rubber will increase the demand for channel black, although its fields of application may be narrowed (as compared with the prewar period) by the availability of suitable furnace blacks at competitive costs. Higher future costs for gas at channel plants, which appear to be in prospect, would operate to the competitive disadvantage of those plants because of the low-product yields.

The principal furnace grades may therefore have the advantage of lower unit production costs which would encourage their substitution for channel blacks, on a price basis, for many purposes for which the two types of black are more or less interchangeable on a quality basis, the report concludes.

U. S. RUBBER FACTORY IS TAKEN OVER BY ARMY

The main Detroit plant and a subsidiary plant of the U. S. Rubber Co. were taken over by the Army on July 30 in an effort to end a 17-day work stoppage that had already cost the Army some 70,000 tires, including those needed for operation of the B-29 bombers. The seizure was carried out by a team of officers of the Detroit regional Air Technical Service Command, headed by Lt. Col. Hervey Humlong. The company's executive personnel was requested to remain at their posts.

Take-over of the plant by the Army followed two attempts by the Regional War Labor Board at Detroit to straighten out a jurisdictional labor dispute. It was a direct outgrowth of a wildcat strike several months ago for which several hundred members were fined $12.50 each by the United Rubber Workers of America. Twelve of these strikers refused to pay the assessed fine and were subsequently expelled from the rubber union. These 12 started to picket the plant on July 13 and thousands of workers refused to cross their lines. This led to the work stoppage and eventual take-over by the Army. U. S. Rubber is held blameless in the dispute by all concerned.

At this writing (August 8), the Navy is continuing to operate the Goodyear Tire & Rubber Co. plants at Akron which it took over on July 5 after 16,000 workers had staged a 20-day walkout and defied back-to-work orders of the War Labor Board seven times. Production at these plants is reported to be back to normal. On August 7 it was announced that, at the Navy's request, the War Labor Board had appointed S. S. Kates, Cleveland attorney, as an impartial umpire to hear and determine certain grievances between the Goodyear management and the workers, including the charge that workers were being downgraded by transfers to lower paying jobs.

The Firestone strike, which started on July 1 and gave indications of following in the footsteps of the Goodyear strike, was settled on July 14, when the strikers voted 3-to-1 to heed a WLB directive to return to work. The workers had been warned that unless they returned to work the Board would take immediate steps to revoke vacation, shift premium, and maintenance of membership benefits previously granted to them.

By order of President Truman, Petroleum Administrator Harold Ickes took possession of the butadiene plant operated at Houston, Texas, by Sinclair Rubber, Inc., on July 19. Operations at the plant were threatened as a result of labor disturbances.

The War Department has recently awarded a $1,500,000 contract for 100,000 rubber mattresses to the K & W Rubber Co., Delaware, Ohio.

FRENCH RUBBER PRODUCTION NOW PROCEEDING SMOOTHLY

There has been a tremendous spurt in rubber production, particularly tires, over the past five months in France, according to an item in a recent issue of the *India-Rubber Journal*. Production indices are now being published with 1938 as the base (100), as that was a typical pre-war year. In March the figure stood at 31 against 10 in January of this year, and 31 in 1943.

The reason for the improvement is, of course, to be found in American aid, which has now ceased. From January until May 31, France produced 325,000 tires, of which the American Army took 127,000. Five factories were responsible for this production—Renault, Dunlop, Michelin, Englebert and Bergoyan. From July 1, however, France has had to stand on her own although there were stocks for about two months handed over by the Americans on which the French were able to continue.

Production Still Controlled

Naturally production is strictly controlled. Tires can be obtained by permit only, and these are difficult enough to get because the army has first call. On the other hand, hygienic goods are not too difficult to buy, although there is a shortage. Hospitals have priority claim but the goods are to be found. Likewise rubber tubing and certain other essential rubber articles are also being manufactured in small quantities. There is a ban on the manufacture of certain goods, including rubber pedals for cycles, rubber mats, and one or two other articles.

The Government has decided to expand the existing plant, according to the article, so it may be taken for granted that the necessary raw materials will be forthcoming now that supplies have stopped from America. One thing is certain, they will not come from the African colonies this year because America has earmarked all African rubber until the end of 1945.

In a statement, the Ministry of National Economy states that by the end of March of this year France received 3,600 tons of rubber, 16 per cent of which was natural. During the same period some 2,200 motor and cycle tires were manufactured. During March, 100 tons of raw material was reserved for recapping tires against 40 tons during February. Further, some 500 tons of used tires were imported from Britain during March. The Ministry statement says that part of the consignment comprised unusual dimensions for France but that, nevertheless, the tires are very useful under present conditions.

The general outlook in rubber is not bright because of the serious coal shortage. It takes about 11 pounds of coal to work just over two pounds of rubber, and coal production at its present rate does not allow the industry a sufficiently large quota. Production, therefore, during the coming months may fall somewhat.

The end of the war in Europe has meant a serious slackening off if not an end to military demands. It must be remembered, however, that raw materials were supplied primarily for military needs and it is not as yet certain from where material for civilian needs is to come. One thing is certain, the industrial rubber goods manufacturers cannot look forward to any great improvement in supplies.

Experiments in the production of koksaghyz rubber-bearing plants have been tried out at Nogent-sur-Marne, and although results can be called satisfactory, it is unlikely that cultivation of this plant will develop beyond the experimental stage. There are two reasons for this: (1) The plant attracts dandelions and weeding and therefore entails a great deal of work, and (2) to produce any serious quantity, wide areas would have to be cultivated, and such areas are not available. On the other hand, rubber yield varied from 3.3 to 10.4 per cent and the finished rubber had a breaking point of 250 kilograms to the square centimeter and elongation of 500 per cent. This is considered quite satisfactory.

Seeks Agency in Belgium

Henri Engelen, who maintains an importing agency at 174 Rue Vanderkindere, Brussels, Belgium, is interested in contacting American manufacturers of pigments and intermediates with a view to representing them in Belgium and Holland. References will be furnished upon request.

Hewitt Expands Capacity

New equipment increasing by 50% the production capacity of its plant has been installed by the Hewitt Rubber Corp., Buffalo, N. Y. The equipment consists of a No. 11 Banbury mixer, with motor and controls, 120-foot stock-cooling conveyors with helical stock cutters, and new conveyor equipment to move rubber compounds into the mixer. An unusual feature of the new conveying system is a special printing machine, mounted over the conveyor, which stamps the rubber stock every two feet with a special yellow ink that does not discolor the final mixture. The cooling conveyors will use a combination of cold liquid spray and air circulation, and the stock will travel 240 feet while cooling. Working conditions are also being improved by installation of a large exhaust system to remove smoke and dust from the mixing area.

New Vanderbilt Appointments

R. T. Vanderbilt Co., Inc., New York City, has announced three recent additions to its laboratory staff at East Norwalk, Conn. Included are: George G. Winspear, formerly an engineer of the Bell Telephone Laboratories, which he has served for 15 years; Dr. Roger Spencer Sweet, for the past two years with the Heyden Chemical Corp.; and Robert K. White, for the past five years with the Youngs Rubber Corp. of Trenton, N. J.

GOODYEAR TIRE PLANT IN TOPEKA, KANSAS, ALREADY IN OPERATION

The Topeka, Kansas, plant of the Goodyear Tire & Rubber, which is expected to be completed this Fall, is already in operation on the production of heavy-duty military tires. An artist's conception of what the finished plant will look like is depicted in the accompanying illustration. The plant is expected to convert to the manufacture of truck and tractor tires, and possibly automobile tires, when war needs end. Representing an outlay of approximately $12,000,000, the Topeka plant is regarded as one of the finest and most modern tire plants in the world. It was designed by J. Gordon Turnbull, of Cleveland, Ohio.

CHAIRMAN OF BRITISH R.G.A. SPEAKS ON POST-WAR RUBBER

T. B. Barlow, chairman of the Rubber Growers' Association, Inc., London, England, speaking at a luncheon given by the Association in London, on July 11, in honor of Col. Oliver Stanley, Secretary of State for the Colonies, and J. G. Winant, U. S. Ambassador to Great Britain, discussed the prospects of the natural rubber industry in the post-war world.

After tracing the history of rubber as a large-scale industry, and paying tribute to the enterprise of the R.G.A. in forming the Rubber Research Institute in Malaya and as leader and spokesman of the British rubber industry, Mr. Barlow spoke briefly on the Malayan Rubber Estate Owners Guarantee Co., which is in process of formation. Describing the organization as "cooperative rationing got by hard work out of goodwill," he disclosed that the company has been designed by the R.G.A. in cooperation with the British Government to assist in the rehabilitation of rubber estates in Malaya.

Turning to a consideration of the rubber industry's future, he stated that at present the R.G.A. is pressing on with chemical research into the intrinsic nature of natural rubber, its chemists being financed by a cess on the rubber exported from Malaya and Ceylon. Two lines of investigation are being pursued, one concerned with agricultural yield, the other with the discovery of new uses for the material. The enforced mixing of synthetic and natural rubber during the war, he added, has increased the knowledge and field of the industry.

Merit of Synthetic Rubber

Taking up the subject of future competition of synthetic rubber, Mr. Barlow stated his belief that for the next four years the world will need all the rubber that can be produced, in view of the depletion of stocks and the damming-up of demand. After that there may be need for the assistance of the Rubber Study Group (the body of American, Dutch and British government officials) in weighing the merits and needs of a synthetic rubber industry which now employs 30,000 people.

The synthetic rubber industry is a vital measure of security to America, Mr. Barlow conceded. On the other hand, the prosperity and well-being of millions of agricultural laborers in the Far East must be considered, as rubber is their only cash crop, hence their only means of absorbing the products of industry. The aid of science and commerce and enterprise must be enlisted to increase the scope of rubber in old places and new, to reduce the cost and increase the output. The evergrowing list of purposes for which rubber is required includes upholstery, springing, flooring and anti-vibration devices. Rubber paving may become a common feature of cities, and new roads of Africa, South America, Russia, India and China foretell an unlimited demand for tires. As costs recede, there will be opportunities unthought of, Mr. Barlow predicted.

Apropos of fluctuating markets, Mr. Barlow asserted that any future regulation of the rubber industry must be a scheme to even-out short term fluctuations which embarrass all concerned, and to maintain the normal trend of increased production. As to the general tendency, he said, there can be no doubt of continued growth, in view of the enormous expansion of the rubber industry in recent years.

Cost of Research

According to a report from the Subcommittee on War Mobilization made to the Senate Committee on Military Affairs covering the government's wartime research and development work in the 1940-44 period, the Rubber Reserve Co. (now the Office of Rubber Reserve of the Reconstruction Finance Corporation) spent approximately $5,000,000 on synthetic rubber research in the period covered. In the same period, the Rubber Development Corporation, which let its first contracts in 1942, spent $220,000 for research, including $70,000 transferred to other government agencies.

Philadelphia to Hold Outing

The Philadelphia Rubber Group will hold its first annual outing at the Oak Terrace Golf Club, Ambler, Penna., on Friday, September 28. An interesting program, including a golf tournament (with prizes for winners and losers) and swimming in an outdoor pool, is being planned. Dinner and entertainment will be provided at the clubhouse in the evening. The clubhouse, which is situated on Route 63, northeast of Philadelphia, is easily reached by automobile, bus or train. Transportation will be furnished from and to the railroad station at Ambler. William B. Dunlap, Jr. (Lee Rubber) is chairman of the outing committee.

Additional "E" Awards

Included among companies receiving the Army-Navy "E" award in recent weeks for production efficiency were the following:

Anaconda Wire & Cable Co., Anderson, Ind.

Heyden Chemical Corp., Princeton, N. J.

U. S. Rubber Co., Providence Plant, Providence, R. I.

A renewal star has also been awarded to the Polson Rubber Co., Garrettsville, Ohio, and a fourth renewal star to the Continental Rubber Works, Erie, Penna.

NATIONAL RESEARCH UNIT URGED IN SPECIAL REPORT

Establishment of a National Research Foundation by Congress for the purpose of promoting a national policy for scientific research and scientific education has been proposed by Dr. Vannevar Bush, director of the Office of Scientific Research and Development, Washington, D. C.

In a report, which was prepared at the request of the late President Roosevelt and was submitted to the White House on July 18, Dr. Bush made three general recommendations:

(1) That the Foundation be formed to develop scientific research, financially support basic research in non-profit organizations, encourage scientific talent in American youth by offering scholarships and fellowships, and promote long-range research on military matters.

(2) That the Foundation consist of nine members, to be selected by the President and be responsible to him, who should serve four years and without compensation.

(3) That the Foundation have the following divisions: Medical Research, Natural Sciences, National Defense, Scientific Personnel and Education, and Publications and Scientific Collaboration.

In submitting the report, Dr. Bush estimated that an adequate program such as he proposed would cost approximately $33,000,000 at the outset and that the cost might rise gradually thereafter.

Cotton Wins Leverhulme Award

F. H. Cotton, lecturer in rubber technology at the Northern Polytechnic, London, N. 7, England, and a frequent contributor to the international rubber literature, recently received one of the Leverhulme Research Grants for 1945. The purpose of this award is to enable Mr. Cotton to make an intensive study of recent developments in rubber technology and the production and utilization of synthetic rubbers and allied plastics. In carrying out this purpose, he intends to spend about two months visiting factories in the United Kingdom studying wartime developments in processing and manufacture, then to visit the United States, Canada and Russia, where he hopes to investigate the applications of materials and processes which have contributed so greatly to the winning of the war.

Organize Synthetic Yarns, Inc.

Synthetic Yarns, Inc., Woonsocket, R. I., has been formed to acquire the Woonsocket rayon plant of the Manville Jenckes Corp. and the throwing plant at Lowell, Mass., which was previously operated by the Yarn Division of Textron, Inc. Synthetic Yarns, Inc., has taken over the commitments for the purchase of supplies and materials previously entered into by both plants.

NEW COTTON FIRE HOSE HAS NO RUBBER LINING

An entirely new technique for making a water-holding cotton fire hose without the use of a rubber lining, has been invented by the United States Department of Agriculture, in the course of research put on an emergency basis when it was feared that Civilian Defense forces might need to fight fires started by Axis bombing. The new type of hose was designed to replace linen hose, and represents an entirely new use for cotton.

Linen hose is in common use in the United States for fire protection. It does not have a rubber lining to prevent leakage, but depends on the swelling of its constituent fibers and yarns to close the minute spaces within its tightly woven structure and prevent excessive loss of water—with an effect similar to that produced by soaking a dry or leaky wooden barrel. Moderate leakage is an advantage, because the outside of the hose becomes wet and cannot burn readily. The absence of rubber lining is another advantage, as rubber deteriorates with age, and fire hose is sometimes kept for years without use.

At the time when there was a threatened scarcity of linen in this country, as well as an actual acute shortage of rubber, it became desirable to find a way to replace those two materials, heretofore considered essential in making fire hose. Consequently, research on the treatment of cotton for the purpose was undertaken at the Southern Regional Research Laboratory of the Bureau of Agricultural and Industrial Chemistry.

Two specialists in cotton and cotton products, Charles F. Goldthwait and Herbert O. Smith, succeeded in solving the problem. This was done by adding to the yarn before weaving a swellable finishing material, not soluble in water, which would supplement the swelling of the cotton, thus helping to close the minute spaces within the fabric of the hose wall. Any form of cellulose or its derivatives, which can be made into a suitable solution, and meets other requirements, can be used. In the experiments at the Southern Regional Research Laboratory, a "commercial hydroxy ethyl ether of cellulose" was found to be the most successful solution.

The shortage of linen for fire hose did not develop to the emergency proportions expected. However, the Agricultural Research Administration anticipates that the new invention (U. S. Patent No. 2,352,707) for improving the swelling capacity of cotton yarn will not only be useful for fire hose, but also will prove applicable to such fabrics as tent cloth, tarpaulins, and outer rain-resistant clothing. Research investigations are continuing in that direction.

Bilco Products Corp. has moved its factory and office from 1706 Lexington Ave., New York City, to larger quarters at 2 Manor House Square, Yonkers, N. Y.

Dr. le Beau Joins Midwest

Dr. Desiree S. le Beau

Dr. Desiree S. le Beau, who since 1940 has been a research associate in the Department of Chemical Engineering of the Massachusetts Institute of Technology, has joined the Midwest Rubber Reclaiming Co. as director of research at its laboratory in East St. Louis, Ill. Dr. le Beau was born in Teschen, Poland, and studied chemistry at the Universities of Vienna and Graz, in Austria, receiving her Ph.D. in 1931. Subsequently, she taught science, chemistry and mathematics in junior college, and later joined the staff of the Austro-American Rubber Works Co. in Vienna as research and development chemist. In 1935 she became consultant to the Societe de Progres Techniques in Paris. The following year she joined the research staff of the Dewey and Almy Chemical Co. at Cambridge, Mass. In 1940 she became a research associate at M.I.T., where she served as principal associate to Dr. Ernst Hauser and participated in the research program conducted by Midwest in collaboration with M.I.T. Dr. le Beau is a member of the A.C.S., A.A.A.S., Sigma Xi, and New York Academy of Science. She has specialized in colloid chemistry and has published a number of papers in the fields of rubber and clay.

Sells Brake Lining Business

The Swan Rubber Co., Bucyrus, Ohio, has announced that its brake lining business and equipment and materials now used in the manufacture of brake lining at its branch plant at Carey, Ohio, have been sold to the World Bestos Corp., Paterson, N. J., subsidiary of the Firestone Tire & Rubber Co., Akron. Swan expects to immediately install other equipment in the Carey plant for expanded manufacture of molded rubber products and to erect a raw materials warehouse beside the present building. A considerable part of the old equipment will be moved by the purchaser to the Firestone factory at New Castle, Ind.

R.M.A. DISCLOSES FIGURES ON WAR RUBBER CONSUMPTION

Statistics on the enormous quantities of rubber products which have been channeled to the armed forces are disclosed in a pictorial booklet entitled "We Had to Have Rubber," recently published by the Rubber Manufacturers Association, Inc.

According to the booklet, airplane tire production climbed from 39,000 units in 1939 to 1,417,000 in 1944; military truck and bus tire output rose from 7,680,000 units in 1939 to 14,713,000 last year; and camelback, which stepped in to keep civilian automobiles rolling by means of recapping, rose from 54,400,000 pounds in 1939 to 359,711,000 pounds in the past year.

Thousands of tons of rubber have gone into armor, artillery, air and ground transport. Endless batteries of 75 mm guns take 414 pounds for every carriage. Medium tanks account for another 840 pounds each in track treads, crash padding and other uses. Every fighter plane required 146 pounds of rubber to get it into the air.

Examples of the enormous quantities of rubber products required by the armed forces are given in the booklet: Tires by the tens of millions to mount vast land, air and amphibious assaults upon enemy strongholds all over the globe; 10,000,000 hard rubber battery cases to power our mechanized attack; more than 150,000 pounds of rubber compound to keep each battleship afloat and in fighting trim; 45,000,000 pairs of rubber boots and shoes to keep our armies on the march, entirely apart from 77,000,000 pairs of rubber soles and 104,000,000 pairs of rubber heels turned out for troops alone in 1944; and more than 30,000 other different rubber products.

The really astronomical figures are reached in the field of rubber-coated materials and rubber sundries. More than 360,000,000 yards of fabrics have been coated since January, 1944, and converted to military raincoats, ponchos, jungle hammocks, flotation gear and other items worth $150,000,000. In the field of rubber sundries, production has reached millions of units on surgical supplies, stopples, gloves, plasma tubing, watertight instrument bags, oxygen masks and thousands of other items essential to the war effort.

A review of the R.M.A. booklet appears elsewhere in this issue.

Wilson to Visit United States

J. Wilson, director of research of the British Rubber Producers' Research Association, which maintains offices in London and laboratories in Hertfordshire, England, will visit the United States next month to acquaint himself with American rubber developments and discuss some of the recent British developments. Mr. Wilson will be accompanied by E. H. Farmer, noted British rubber technologist.

POST-WAR CIVILIAN GOODS ARE REVIEWED BY GOODRICH

As soon as military demands begin to decline, many rubber manufacturers will be able to offer civilian markets a number of products which have been monopolized by the armed services since Pearl Harbor. The B. F. Goodrich Co. recently issued a review of some of the products it will offer, none of which were born of the war period. Although these products have their roots in research and development work done in prewar years, all of them have been advanced, field-tested and improved under the exacting usages of total war.

From the standpoint of the consumer, the most eagerly-awaited of the Goodrich products — with the possible exception of new passenger-car tires—is Koroseal. This coke, limestone and salt derivative was becoming familiar to the public in prewar years in shower curtains, umbrella covers, rainwear, wristwatch straps, translucent belts and novelties.

But the very characteristics that made this versatile synthetic plastic of interest to the consumer made it indispensable for war. Facilities for the production of polyvinyl chloride, the base raw material for Koroseal, have been increased more than ten-fold since 1939. Yet virtually all of the production in the last four years has gone into actual military or high-priority civilian uses.

Considerably more than half of the company's boosted output of plasticized polyvinyl chloride is being used to make insulation for wire and cable on shipboard and aircraft, where its great resistance to flame and the fact that less of it is required than rubber make it a "must."

In peacetime this same material will help cut home fire loss. "Misuse of electricity," including faulty insulation, normally ranks second among known causes of home fire losses in this country. According to George Fowles of B. F. Goodrich, in the last five years the nation's wire and cable industry has been converted almost completely to the use of thermoplastics and synthetic rubbers for insulating, after 50 years of continuous use of natural rubber for this purpose.

One of the most useful roles Koroseal is expected to play in the postwar world was discovered recently in an ordnance plant. Workers there needed a shield against fuming nitric acid. Woven fibreglass suits worn by the workers were both fireproof and acid-proof. But fuming acid still penetrated interstices in the cloth. When coated with Koroseal, however, the suits became completely impermeable. Now it is expected Koroseal will be used extensively as a coating for industrial garments where protection against acids, fumes and similar hazards is essential.

For the future those in charge of Koroseal development envision upholstery fabrics both for outdoor and living room furniture that will be of the most delicate materials and colors, yet be virtually immune to the ravages of sun, weather and other enemies of fabrics; draperies either coated or woven entirely of Koroseal filaments which can be cleaned with the family garden hose; heavy, leather-like Koroseal products for automobile tops and upholstery that will withstand more flexings than present-day products, and will, of course, be impervious to sunlight, oxidation and oils; similar materials that can be embossed and used for luggage, purses and similar products; full-bodied fabrics with a brilliant gloss, or others with a coating so light and dull as to be almost imperceptible.

The Torsilastic Spring

One of the most revolutionary single changes, of both design and material, in postwar automobile construction is the result of a wartime application of the "Torsilastic" spring. This new and simple spring was born in the late 1930's, exhibited at the Goodrich section in the New York World's Fair. But in war its simplicity, lightness and small size made it a big production item for those landing vehicles known informally as "water buffaloes," "alligators" and "beach busters."

With the item in volume production, its installation on buses became a natural, and about 1,000 of one company's big buses, planned to be built this year, will be sprung by the rubber-in-torsion devices. The company also believes the Torsilastic spring principle can be applied to swivel chairs, porch swings, built-in ironing boards and countless other articles in the postwar world.

Another prewar Goodrich product brought into prominence and big production by war needs is the endless-band track, due to be the "shoes" for postwar tractors. Because of improvements, the self-laying track vehicles of this war move at high speed without excessive vibration, and travel over macadam or concrete roads without undue punishment either to themselves or the paving.

In the case of the "Weasel," for which Goodrich designed special rubber "snowshoes," they can go over snows and swamps, and up and down mountains. The postwar tractor will give the farmer a smoother ride, even when moving at a right angle to old corn rows, than he has ever had before.

The much-publicized self-sealing gasoline tank will find its peacetime application. Already Goodrich is making a non-combat version of the bullet-sealing fuel-cell for cargo planes, and expects to make other variations that will be crash-proof gas tanks for future trucks and buses.

Rechargeable wet cell flashlight batteries, along with recharging units, are another recent development which may win a place in the postwar world. Advantages claimed over the conventional dry-cell battery are greater savings and increased efficiency, where flashlights are given hard and active use.

CHICAGO GROUP GOLF OUTING ATTENDED BY RECORD CROWD

A record crowd of approximately 135 members and guests attended the annual summer Golf Outing which was held by the Chicago Rubber Group at the Hickory Hills Golf Club, Chicago, Ill., on July 27. Low Gross winners of the day were Jim Adams and Bob Oppenheim, both of whom had a score of 74, and Charles Brooks, who finished with a score of 77.

As usual, golf and door prizes were distributed after the evening dinner. The committee in charge of the Outing included V. K. Melvin, E. T. Myer, J. P. Sheridan, William Krumpler, and J. T. Adams. Prizes and entertainment were made possible through contributions from the following firms:

Advance Solvents & Chemical Corp., Akron Standard Mold Co., L. Albert & Son, American Mineral Spirits Co., American Viscose Corp., American Zinc Sales Co., J. J. Becker, Bibb Manufacturing Co., Binney & Smith Co., Bridgewater Machine Co., Godfrey L. Cabot Inc., Callaway Mills, Carter Bell Manufacturing Co., Chicago Belting Co., Commerce Petroleum Co., Consumers Co., Continental Carbon Co., Cupples Co., Darling & Co., Deering Milliken & Co., T. A. Desmond & Co., Diamond Wire & Cable Co., Dill Manufacturing Co., Du Pont, Eagle Picher Sales Co., Frost Rubber Works, General Atlas Carbon Co., Geneseke Bros., M. A. Goldberg, C. P. Hall Co., Herron Bros. & Meyer, J. M. Huber, Inc., Hycar Chemical Co., Ideal Roller & Manufacturing Co., Industrial Rubber Goods Co., Inland Rubber Corp., International Smelting Works, Douglass P. Johnstone, Kraft Chemical Co.

Additional Contributors

Also La Jone Rubber Works, Marbon Corp., Geo. S. Mepham Corp., Midwest Rubber Reclaiming Co., Minot Hooper Co., Monsanto Chemical Co., H. Muehlstein & Co., National Rubber Machinery Co., National Standard Co., Naugatuck Chemical, New Jersey Zinc Sales Co., Palmer Asbestos & Rubber Corp., Pequanoc Rubber Co., Philadelphia Rubber Works, Pittsburgh Plate Glass Co., Resinous Products & Chemical Co., Rex-Hide, Inc., Roth Rubber Co., RUBBER AGE, W. H. Salisbury & Co., A. Schrader's Son, A. Schulman, Inc., Scott Testers, Inc., Sherwin-Williams Co., Stanco Distributors, Inc., Standard Rubber Supplies Co., Thiokol Corp., Titanium Pigment Corp., Turner Halsey Co., Union Asbestos & Rubber Co., United Carbon Co., U. S. Rubber Reclaiming Co., Van Cleef Bros., R. T. Vanderbilt Co., Western Shade Cloth Co., Witco Chemical Co.

A bulletin which sets forth the specifications and typical properties of various hydrocarbons manufactured by Phillips Petroleum Co., Bartlesville, Okla., has recently been issued by the company.

HELIUM USED SUCCESSFULLY TO INFLATE AIRPLANE TIRES

The use of helium instead of air to inflate large airplane tires has been successfully accomplished, according to the Goodyear Tire & Rubber Co., Akron. At Akron Airport, plane tires have been filled with helium by using Goodyear's solution 100 pump to extract the air and to introduce the helium. The evacuation of all air on initial inflation had been one of the obstacles to the use of helium, but tests have now proved that the air in a large aircraft tire can be evacuated in a matter of a few minutes by this method.

The chief obstacle to the use of helium, its rapid diffusion through natural rubber, has been overcome by using Butyl rubber tubes. Dual Seal tubes, which are built on the principle of Goodyear's LifeGuards, and which embody extra safety, are also satisfactory for the use of helium.

Tests have proved how greatly Butyl rubber reduces diffusion. Helium through natural rubber diffuses two and one-half times faster than air. By using Butyl the rate of diffusion is only one-fourth as fast as helium through natural rubber. Net result of this is that the diffusion of helium through the Butyl tube is only 67% as fast as air through natural rubber. The Dual Seal tube adds weight above that of an ordinary tube, but this is largely offset by the weight saved by using helium instead of air.

The use of helium in airplane tires will substantially reduce plane weight, thereby increasing range and useful loads and hence adding to revenues. Ninety-two pounds of air are required to inflate a 110-inch tire, whereas only 13 pounds of helium are needed. Thus, there is a total saving of 158 pounds for the two main wheels of each plane, plus the weight saved by using helium in the plane's nose wheel. Goodyear estimates that each pound of weight saved in commercial transport operation is worth $100 per pound annually in added passenger and freight revenues.

Properties of 1,3-Butadiene

Experimental work on the thermodynamic properties of 1,3-butadiene has been in progress at the U. S. National Bureau of Standards, Washington, D. C., for several years, and brief preliminary reports of the results have been issued from time to time. A complete description of these results was presented in the July, 1945, issue of the *Journal of Research*, published by the Bureau. The properties investigated include the specific heat of solid and liquid from 15° K. to room temperature, the heat of fusion, the triple point, the heat of vaporization at several temperatures, the vapor pressure from —80 to +150° C., the density of the saturated liquid and of the superheated vapor, and the critical constants. By the use of these data, a consistent set of tables of thermodynamic properties was compiled.

Remember this Emblem

It stands for Honorable Service to the country. It is worn by men and women who have been honorably discharged from the Armed Forces. It means that the wearer has done more than his or her share in maintaining American ideals. It is truly a mark of merit. Remember it!

Drop Price on Neoprene Latex

A further reduction on the price of neoprene latex has been announced by the Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware. The following range of prices, dependent on quantity, is now in effect: Type 571—25c to 29c per pound; Type 571 Concentrated—28c to 32c; Type 572—28c to 32c; Type 60—28c to 32c. All prices are f.o.b. Carney's Point, N. J. According to DuPont, production capacity of neoprene latex is well in excess of current sales and a substantial inventory of all types of such latex is being maintained. The company feels certain that neoprene latex will be available for all requirements and no shortage will occur unless the progress of the war should change suddenly, causing very much larger quantities to be required for war products than has existed in the past. It seems unlikely, however, that any new war demands will jeopardize the current supply position.

Firestone Marks Anniversary

Harvey S. Firestone, Jr., president of the Firestone Tire & Rubber Co., Akron, on August 3 marked the 45th anniversary of the founding of the company with a statement in which he paid tribute to the 14,000 members of the organization now on fighting fronts and the company's 95,000 employees and outlined activities of the firm in the post-war period. As soon as the government gives the word, the company is prepared to reconvert its factories from wartime to peacetime production, Mr. Firestone said, and lessons learned through all-out war production will be used to produce hundreds of new and better products.

SILICONE SYNTHETIC RUBBER ANNOUNCED BY DOW CORNING

The commercial availability of Silastic, a silicone rubber, produced in various stocks for molding, extruding, coating and laminating, has been announced by the Dow Corning Corporation, Midland, Mich. Largely because of the inorganic origins, these rubbery organo-silicon oxide polymers remain elastic after heating at temperatures up to 500° F. and retain flexibility at temperatures as low as —70° F.

Silastic stocks are available for molding flat sheets, gaskets and other shapes. Silastic coated lead wire and other continuous extruded shapes are made from Silastic stocks designed for extruding. Also available are Silastic stocks compounded for coating glass or asbestos cloth to produce flexible, water-proof, heat-stable, oil-resistant gaskets, diaphragms, tape and electrical insulation which is non-tracking, arc and oxidation resistant.

Laminates may be made by curing under pressure multiple layers of Silastic coated inorganic fabrics. Silastic is also used to insulate wire wound resistors with waterproof, heat-resistant, elastic coatings able to withstand the severe and repeated thermal shocks specified for Grade I Class I resistors.

Silastic coatings adhere to glass, vitreous enamel, iron, steel and aluminum. They constitute protective coatings which are resistant to oil and salt brines at elevated temperatures.

Silastic stocks now available are said to have exceptional temperature stability, tensile strength of from 200 to 330 pounds per square inch, elongation ranging from 70 to 115%, high resistance to water, brine and oil, and electrical properties of the following magnitude: dielectric constant at 1,000,000 cycles of 5.0 to 7.5; power factor at 1,000,000 cycles of 0.13% to 0.18%; and dielectric strength of 500 volts per mil.

Paraplex G-25 Used in Cables

One of the most closely guarded secrets of the war was recently lifted in part by the Navy with the announcement of the Resinous Products & Chemical Co., Philadelphia, Penna., that its Paraplex G-25 is used to prevent premature failure and loss in signal strength of high frequency cables for Navy equipment. Paraplex G-25 is a "polymeric" plasticizer, said to be the first resinous type plasticizer compatible with polyvinyl chloride. This plasticizer imparts low heat deformation to rigid polyvinyl chloride stocks and is reported to be an efficient plasticizer for chlorinated rubber and cellulose nitrate, as well as certain thermosetting phenolic resins. It is also said to be useful in special resistant aircraft caulking and seam sealing compounds, and its superior oil resistance, permanence and low extractability is regarded as of special significance in fabric coatings.

NAMES IN THE NEWS

BENJAMIN S. GARVEY, JR., Goodrich research chemist, who recently served as a member of the special technical mission investigating the German synthetic rubber industry, has been named technical service manager on rubber chemicals for the B. F. Goodrich Chemical Co., Cleveland.

ROLLIN D. HAGER, production superintendent, industrial products division, B. F. Goodrich Co., Akron, has been named general superintendent of that division, succeeding G. L. MATTHIAS, who has resigned because of ill health. H. L. DIXON, formerly manager of reclaim production, becomes production superintendent of the division, and H. L. SLINGLUFF manager of reclaim production.

G. B. HAFER, sales manager of the laboratory chemicals division of the J. T. Baker Chemical Co., Phillipsburg, N. J., since 1935, has been advanced to the position of general sales manager of all Baker divisions. CHARLES H. SLATER, who has served the company for 11 years, most recently as division sales manager of fine and industrial chemicals, has been given the additional duties of supervising advertising and publicity.

ERNEST E. ARRINGTON, manager of recap plant operations of the B. F. Goodrich Co., Akron, for the past five years and associated with the company for almost 19 years, has been appointed manager of camelback, repair materials and accessory sales of the replacement tire sales division.

MARCUS ROYEN, associated with the H. O. Canfield Co., Bridgeport, Conn., as a research chemist for several years, has joined the Apex Tire & Rubber Co., Pawtucket, R. I., as chief chemist.

JOHN L. COLLYER, president of the B. F. Goodrich Co., Akron, has been reelected a member of the board of trustees of Cornell University, his alma mater, for a five-year term.

T. M. MAYBERRY, treasurer of the Firestone Tire & Rubber Co., of Canada, Hamilton, Ont., and J. H. FORMAN, factory manager, have been named vice-presidents of the company. R. I. RAYCROFT, manager of manufacturers' sales, has been appointed general sales manager.

ROBINSON ORD, formerly assistant general manager of sales of the Organic Division of the Monsanto Chemical Co., St. Louis, Mo., has been named general manager of sales to succeed the late FRED C. RENNER. ARTHUR P. KROEGER has been appointed an assistant general manager of sales of the division.

CORP. CHARLES H. BURGER, son of George J. Burger, tire dealer consultant of New York City, recently arrived home from Africa, where he has been serving with the AAF, Air Transport Command, for the past 19 months.

FRED V. LARKIN, associated with the Hood Rubber Co. for the past few years, and prior to that with the Goodyear Tire & Rubber Co. at Windsor, Vermont, is now connected with the Atlantic Tubing & Rubber Co., Providence, R. I.

HERBERT H. GARIS, president of the J. T. Baker Chemical Co., Phillipsburg, N. J., was recently honored for completion of 40 years of service with the company at a luncheon given by 500 employees. A platinum watch, appropriately inscribed, was presented by men of the Forty Year Club and representatives of the Employee's Association.

RALPH HORTON, president of Miller Marine Decking, Inc., has been elected president of Great American Industries, Inc., New York City, parent organization of Virginia Rubatex, succeeding HAROLD W. HARWELL.

ARTHUR G. JANSSEN, formerly a research associate of Brooklyn Polytechnic Institute, Brooklyn, N. Y., is now connected with Johnson & Johnson, New Brunswick, N. J.

E. W. BIGGS, chief of the Aldehyde Unit, Chemicals Bureau, WPB, Washington, D. C., for the past three years, has been appointed to the general sales staff of the Heyden Chemical Corp., New York City, and will represent the company in Pennsylvania and western New York.

RAYMOND D. OLSON, manager of the sales engineering department of Taylor Instrument Companies, Rochester, N. Y., has been appointed general sales manager.

DR. L. B. ARNOLD, JR., formerly assistant director of the chemistry division of the metallurgical laboratory of E. I. du Pont de Nemours & Co., Inc., at Chicago, Ill., has joined the staff of Arthur D. Little, Inc., Cambridge, Mass.

GLENN D. BABCOCK, sales manager of the Mishawaka Rubber & Woolen Mfg. Co., Mishawaka, Ind., for the past eight years, has been made a vice-president and a director of the company.

PAUL W. LITCHFIELD, chairman of the Goodyear Tire & Rubber Co., Akron, recently received a company service pin commemorating his completion of 45 years of service with Goodyear.

DR. LESLIE A. BROOKS, who has been associated in the past with the Hooker Electric Co., the Sprague Electric Co., and the Edcan Laboratories, has joined the Research Division of the R. T. Vanderbilt Co. at South Norwalk, Conn. He received his B. S. in chemical engineering from M.I.T. in 1935 and a Ph. D. in organic chemistry from the University of Illinois in 1941.

RALPH SYMONS, until recently Eastern technical representative of the Wilmington Chemical Corp., has joined the Carr Manufacturing Corp., Bristol, R. I., as chief chemist. He has served in the past with Dunlop Tire, Canada Wire & Cable, and Firestone.

PHILIP E. RICE, factory manager of the Naugatuck, Conn., chemical plant of the U. S. Rubber Co., has been named factory manager of the government synthetic rubber plant at Los Angeles, Calif., which is operated by the company, succeeding F. S. CARPENTER, who has been transferred to the plantation division, with headquarters in New York City. DONALD L. MCCOLLUM, production manager of the chemical plant, will succeed MR. RICE.

HENRY G. SCHMIDT, associated with the Norwalk Tire & Rubber Co., Norwalk, Conn., since 1914, has been advanced to the position of general superintendent of the company.

GEORGE EMBLETON, rubber controller for the Union of South Africa, is currently on a visit to the United States to exchange information on rubber production with military leaders and rubber industrialists.

GLENN A. MELLINGER, who has served the Ohio Rubber Co., Willoughby, Ohio, since 1936 as a sales correspondent and as chief expeditor of war materials, has been promoted to the position of assistant sales manager.

SAM L. BROUS, manager of technical service of the B. F. Goodrich Chemical Co., Cleveland, Ohio, has been named sales manager of a new division of that company for the promotion of thermosetting resins. He has been associated with Goodrich since 1929.

STEPHEN S. ANDREWS, formerly production superintendent at the synthetic rubber plant operated at Naugatuck, Conn., for the government by the U. S. Rubber Co., has been transferred to the company's Gillette Tire Plant at Eau Claire, Wisconsin.

JOHN E. FORD, JR., associated with the M. W. Kellogg Co. for the past eight years, and who served as project engineer in the construction of the synthetic rubber plant at Sarnia, Canada, has been appointed executive assistant of the Houdry Process Corp.

RECAPPING AND REPAIRING TO CONTINUE IN POST-WAR

Even after new tires have become plentiful, recapping and repairing of passenger car tires will continue to be a substantial part of tire dealers' income, W. L. Clarkson, Jr., manager of camelback and repair materials sales, U. S. Rubber Co., recently predicted.

"We cannot gauge post-war possibilities based on what car owners did about their tires before the war," said Mr. Clarkson. "It is true that the recapping of truck tires was generally accepted as the most economical way of getting the full mileage built into the casing of a tire. Passenger car owners, however, were not sold on the safety and economy of recapping, nor did the industry make any effort to sell them on this feature. Recapping of passenger car tires was therefore not an integral part of the dealers' tire replacement business.

"During the war, many millions of owners were introduced to recapping for the first time, due to compulsory government regulations. Recapping was the only means of keeping their cars rolling and it is perfectly safe to say that in practically every case where this recapping was efficiently done, they obtained more satisfactory results than they thought was possible. This excellent service given to owners, who would otherwise be without their own means of transportation, was made possible even with synthetic materials. As a result, a goodly percentage of these car owners will continue with recapping after the war.

Prestige Is At High Level

"Today, large numbers of car owners are sold on recapping, not only from their own wartime experience but because the prestige of recapping has been raised to a much higher level. Car owners who are still riding on the tires 'that came with the car' have been able to do so only because they have nursed them along by scarcely using them at all. But these owners know that the time is pretty nearly here when their tires will no longer be safe, and they are greatly encouraged by reports of their friends who have had tires recapped that have given such economy and safety.

"A great deal of advertising space has been devoted by rubber companies and their dealers in advertising quality recapping with the consequent safety and economy of this procedure. It is on these factors that I base my opinion," Mr. Clarkson said, "that recapping is not only here to stay but will play a very important part in the motoring public's tire buying habits and the tire replacement business of dealers. I know that after the war, or even sooner if conditions within the industry permit, our company, and undoubtedly others, will actively merchandise as well as advertise quality recapping and expert repairing.

"Our company has gone very thoroughly into the study and processing of materials and techniques so that we can say forcibly to car owners that recapping can be done so well that it is the safe, practical way of obtaining the long mileage originally built into the carcass of the tire. Leading independent tire dealers have incorporated tire rebuilding in their postwar plans, realizing that it will be an integral part of their tire replacement business.

"In the immediate future, recapping business will be increased as gasoline rationing becomes relieved, allowing somewhat near normal yearly mileage which, of course, will wear out the treads of a large portion of the new tires that were produced in 1944 and have been made available since the beginning of this year."

Mr. Clarkson believes that if the industry does produce 22 million passenger car tires in 1945, that number is not going to fill the needs of car owners, with the result that many of them will be forced to recap in order to continue driving their cars.

Turkey's Rubber Bearing Plants

A study of rubber-bearing plants of western Anatolia, Turkey, which was made during 1944 revealed that plants yielding 28.5% of a rubber-like substance grow in abundance near Lake Tuzlu, close to Dinar, according to the U. S. Bureau of Foreign & Domestic Commerce. Studies are now being made to determine how long it takes the plants to mature and whether they are of sufficient economic importance to form the basis of a new industry in that region.

Introduce New Lightweight Apron

A new lightweight, acid, alkali, and oil-resistant apron, made from fabric coated on one side with a black vinyl resin, for use in the canning and other industries, has been announced by the B. F. Goodrich Co., Akron. The neck and waist tape is in one piece and is sewed into the hem of the arm cut-out, giving the apron strength and rigidity, as well as a good drape, while all edges are hemmed. The aprons are made in two sizes, 29 by 35 inches and 35 by 45 inches.

T. D. SLINGMAN, formerly vice-president of mechanical sales of the Dayton Rubber Mfg. Co., Dayton, Ohio, has been appointed manager of industrial sales of the Baldwin-Hill Co., Trenton, N. J.

PAUL C. JONES, who has been with the Goodrich organization since 1927, recently as technical representative on chemical sales, has been named field technical manager of the B. F. Goodrich Chemical Co., Cleveland, Ohio.

SYNTHETIC RUBBER PROGRESS REVIEWED BY WARD KEENER

Since Pearl Harbor, the United States has produced as much synthetic rubber as the entire world's supply of natural rubber for all the 17 years from 1900 through 1916, J. Ward Keener, assistant to the president of the B. F. Goodrich Co., Akron, told business leaders of Birmingham, Ala., on August 7.

Despite the virtual doubling of the world's total capacity for producing rubber—by reason of war-born synthetic rubber plants—Mr. Keener said the world could soon absorb such a surplus if other nations remotely approached America in their uses of the commodity. For instance, he said, if Russia, India and China were to increase their per capita rubber consumption to merely 2 pounds per year—only a seventh as much as the American per-person rate—that would increase world demand by a million tons a year, absorbing all the potential "over-production."

Making a plea for the retention of a "strong competitive incentive" toward constant improvement of material and reduction in costs, Mr. Keener said American synthetic rubber can be made and sold economically at "under 20 cents a pound" after the war. He urged that synthetic rubber be kept free from tariffs, subsidies, cartelization or other artificial restrictions. "If such freedom exists, we shall have placed an effective ceiling on natural rubber prices and the world will be assured of ample rubber supplies at economical costs," he said.

The benefits in improved products at lower cost, stemming from "truly competitive" enterprise, are well exemplified in the tire industry's record over the last 25 years, the Goodrich executive stated. The average "tire cost per 1,000 miles of travel" has been reduced in that time from $2.35 to 65 cents, he said, and explained that today's synthetic passenger-car tires contain 50 per cent more material than their natural rubber predecessors of 25 years ago, give 135 per cent greater mileage, yet cost 35 per cent less.

Mr. Keener also said that "even A-card holders" may be able to buy new tires on a rationed basis by the end of this year, and on an unrationed basis sometime in 1946. The 89 million tires estimated for 1947, he said "will put all the old vehicles, trucks and autos—as well as several million new ones—in first-class condition so far as tires are concerned."

To acquaint coated abrasive users with its new system for identifying coated abrasives, the Carborundum Co., Niagara Falls, N. Y., has issued "Sanding and Finishing," an 84-page booklet containing information about coated abrasives. The booklet contains comprehensive recommendations for the use of coated abrasive products in plastics, metalworking, woodworking, shoe and leather trades, etc.

FINANCIAL NEWS

RECORD SALES AND EARNINGS FOR U. S. RUBBER COMPANY

Operations of the U. S. Rubber Co. during the first half of 1945 resulted in the largest sales and earnings for a comparable period in the history of the company, according to a statement issued to the stockholders on July 27.

The net income amounted to $7,121,720, after provision for Federal and foreign income taxes and renegotiation of war contracts of $38,962,196, which is equal to $2.57 a share on 1,759,092 common shares. This compares with a net income of $5,852,827, after provision of $28,492,214 for taxes and renegotiation and provision for $4.00 in dividends on the 8% preferred stock, or $1.85 a common share, in the first half of 1944. Consolidated net sales, exclusive of the volume of business done for the Government on a cost-plus-fixed-fee basis, amounted to $268,447,897. This is an increase of 22% over the same period of 1944.

War production continued to account for the major part of the company's operations. Although it experienced cutbacks in some kinds of military output, such as ammunition, these were offset by increases in others, according to the report. The company consumed 44% more synthetic rubber and 38% more synthetic plastics in the first half of 1945 than in the first half of the previous year.

The consolidated balance sheet as of June 30, 1945, shows current assets of $173,745,574, including cash of $26,974,825 and U. S. Treasury bonds of $5,000,000, compared with current assets of $157,209,948, including cash of $22,479,654 and U. S. Treasury bonds of $5,000,000 on December 31, 1944. Accounts and notes receivable from customers, less reserved for doubtful accounts ($2,477,158 for 1945), totaled $53,621,486 against $51,004,830 at the close of 1944. Total inventories, at lower of cost or market, were $85,965,263, compared with $75,425,099.

Current liabilities, including accounts payable of $24,115,711, aggregated $85,869,119. This compared with $20,725,278 and $63,477,176, respectively, on December 31 last. Accrued Federal income and excess profits taxes and renegotiation of war contracts (less U. S. Treasury Savings notes of $22,071,628 for 1945) were $38,435,173, against $18,599,586 on December 31, 1944, when U. S. Government Treasury notes totaled $23,251,612.

The company retired $1,500,000 of its 10-year 2% serial bank notes on June 27, 1945.

Increases in the company's military output indicate the important part rubber is expected to play in the war against Japan, Herbert E. Smith, president, stated in the report.

General Tire & Rubber Co.

Six Months Ended May 31: Net income of $1,211,801, which is equal to $1.78 a common share, and which compares with $1,209,560, or $2.02 a share, for the corresponding period of the previous fiscal year. Record net sales of $44,189,565 compares with $33,367,327 for the six months ended May 31, 1944, an increase of 32.4%. According to the company report, the lower per share figure this year resulted from an increase of common stock in May through the sale of one additional share for each eight outstanding shares.

Hercules Powder Company

First Half: Net earnings of $2,898,767, after deduction of $8,695,907 for estimated Federal taxes and provision of $200,000 for contingencies, which is equal to $2.00 a share on 1,316,710 shares of common stock outstanding after payment of preferred dividends. This compares with net earnings of $2,182,174, after estimated Federal taxes of $5,645,463 and provision of $200,000 for contingencies, equivalent to $1.46 a share on common stock, for the first half of 1944. Net sales of $56,590,752 compare with $52,096,331.

Dewey and Almy Chemical Co.

First Half: Consolidated net profit of $312,868, which, after deduction for dividend requirements on preferred stock issued in April, is equal to 93c a share on 307,146 common shares outstanding. This compares with $311,029, equal to $1.03 a share on 301,157 shares, for the same period of the previous year. Net sales of $6,053,647 compare with $5,050,038 for the first six month of 1944.

United Shoe Machinery Co.

Year Ended February 28: Net income of $7,603,536, after provision of $9,805,000 for taxes and contingencies, which is equal to $3.14 per share of common stock, after deduction of $386,510 for preferred stock dividends.

St. Joseph Lead Company

First Half: Net income of $2,845,384, which is equal to $1.44 a share on 1,975,465 shares, and which compares with $2,225,287, or $1.12 a share, for the first half of 1944. Net sales of $24,760,340 compare with $25,216,498.

Some literature covering the properties of Ameripol D has been issued by Goodrich. Several suggested formulas for various end-products are included.

Develop New De-Icing Process

To combat the formation of ice on the Army's new C-82 Packet cargo planes, the U. S. Rubber Co. has developed a process which involves the distribution of hot air from the plane's engine exhausts to all parts of the wings and to the tail assembly through a system of non-metallic ducts. Traveling at high velocity, the air is dissipated to the outer surfaces, raising the outside temperature to 130°. The exhaust heat is piped directly from the plane's two 2100 h.p. engines into four cross-flow heat exchangers, two mounted in each engine nacelle. Air is brought in from the outside, heated in the exchangers to a temperature of 350°, then is carried under pressure to all parts of the plane. The ducts which carry the heat are made of fire-resistant glass fabric combined with synthetic rubber and resins and are supplied in a wide variety of sizes and shapes to follow the contours of the plane's interior.

Goodyear Vinyl Plastics Plant

The Goodyear Tire & Rubber Co., Akron, which formerly planned to build a vinyl plastics plant at Natrium, W. Va., has decided to locate the plant in Niagara Falls, N. Y., owing to the greater availability of raw materials and lower cost of plant investment. Construction, which was scheduled to begin in the middle of August, is expected to require approximately six months. Built of cement block and steel, in chemical utility type construction, the new plant will consist of several buildings and will occupy eleven and a half acres. A group of plastics made from acetylene derived from lime and coke will be manufactured. These products, which will be used in the manufacture of transparent packaging film, wire insulation, fabric coatings, flooring, wall coverings and adhesives, will be shipped to other plants for processing.

Vulcanized Rubber Changes Name

The name of the Vulcanized Rubber Co. has been changed to the Vulcanized Rubber and Plastics Co. The company maintains general offices at 261 Fifth Ave., New York 16, N. Y., and its plant at Morrisville, Bucks County, Penna. Since the company has expanded its research, engineering and manufacturing facilities in recent years on hard rubber, soft rubber, and plastic molded parts and products, it is believed that the new name will be more descriptive of its present services.

Forms Adhesive Cement Division

In addition to its previous activities in the manufacture of pressure-sensitive industrial tapes, Industrial Tape Corp., New Brunswick, N. J., has announced the formation of an Adhesive Cement Division for the production and servicing of a line of rubber-based and resin-based cements. These cements include special products for use in bonding and combining rubber, metals, plastics, textiles, etc.

Synthetic Saves Auto Repairs

Hycar Chemical Co., Akron, has recently revealed the results of a survey among manufacturers of automobile parts in Cleveland, Ohio, which indicates how costs and repair bills on post-war automobiles may be cut down by the use of synthetic rubber parts. A synthetic rubber seal which resists alcohol or any other type of anti-freeze which might be encountered in an automobile radiator has enabled Thompson Products, Inc., to make a leak-proof water pump as a replacement for the pump using conventional packing, which required periodic tightening of the packing. The Gabriel Co. reported the use of a synthetic rubber ring on the piston of its hydraulic shock absorber to seal the hydraulic oil in the proper compartment. This ring is expected to retain its sealing qualities for the life of the shock absorber and to resist heat, friction and the deteriorating effect of the oil. In both cases, the material employed was Hycar. Jack & Heintz, Inc., also reported the use of Hycar rubber tubing as a substitute for copper in its automatic pilot for airplanes.

Goodyear Opens Product Exhibit

A permanent display which will reflect the myriad activities of the Goodyear Tire & Rubber Co. will shortly be opened by the company in Goodyear Hall, Akron. One of the outstanding exhibits will be the "Avenue of Tires," which will include one tire of every type or classification manufactured by the company. Other activities represented will be the Goodyear textile mills in Alabama and Georgia, the coal mine in southern Ohio, the aviation plants in Ohio and Arizona, the research laboratories, the synthetic rubber plants, and the shoe products and mechanical goods departments. Reproductions of the Far Eastern plantations will also be shown. The exhibit will contain a permanent museum with a replica of the house in which Charles Goodyear discovered the process of rubber vulcanization in 1839.

Inaugurates Chemical Department

Standard Oil Co. of Indiana has announced the organization of a new chemical products department in recognition of the increasing importance of the manufacture of chemical products from petroleum. The immediate duties of the department will be to explore the market for petroleum chemicals, to work with research and manufacturing departments in developing and producing marketable derivatives, and to manage sales and distribution. The new department will be under the direction of Bruce K. Brown, vice-president in charge of development. William B. Plummer, formerly manager of the company's development and patent department, who was recently released from the army, will serve as manager, and Howard R. Peterson, a member of the company's sales technical service staff, will be in charge of sales development.

Baker Chemical Advances Hafer

G. B. Hafer

G. B. Hafer, sales manager of the Laboratory Chemicals Division of the J. T. Baker Chemical Co., Phillipsburg, N. J., since 1935, has been advanced to the executive position of general sales manager of all Baker divisions. Mr. Hafer has been associated with the Baker organization for the past 19 years, serving at one time as manager of the Chicago office. At the same time it was announced that Charles H. Slater, division sales manager of fine and industrial chemicals, has added the supervision of advertising and publicity to his present duties.

Pioneer Buys Glove Factory

The Pioneer Rubber Co., Willard, Ohio, has purchased the Peerless Glove Co., Inc., of Grand Haven, Mich., which specializes in quality leather and canvas gloves. Pioneer, which recently has been unable to obtain sufficient quantities of canvas gloves for coating with synthetic rubber, has formed a new corporation with a capitalization of $100,000 and will operate Peerless as a separate division. All stock in the new corporation has been retained by officers of Pioneer. The president of the new company is Jack Gibson, while J. C. Gibson, president of Pioneer, is vice-president and treasurer.

Find Chemical Companies Guilty

Nineteen chemical companies were fined a total of $142,500 by Judge William H. Holly in the Federal Court at Hammond, Ind., on July 16, when they failed to contest indictments charging anti-trust law violations. Six indictments were returned by the Justice Department on June 26, 1942, charging price-fixing and control of production and the channels and methods of distribution in the sale of six acids essential to the rubber and other industries. Among the firms indicted were DuPont, Dow Chemical, and Monsanto.

Retires as Dayton Chairman

John A. MacMillan, founder of the Dayton Rubber Manufacturing Co., Dayton, Ohio, has resigned as chairman of the board of that company, a post he has held for many long years. He continues, however, as a member of the board. The story of Dayton Rubber is synonomous with the story of Mr. MacMillan. Coming to Dayton in 1908 from Denver, Colorado, where he recovered from tuberculosis, Mr. MacMillan first won recognition as a manufacturer of tires for fire engines. In 1916 the company began its first real expansion and started the production of pneumatic tires. In 1919 a larger plant was secured and A. L. Freedlander, now president and general manager, joined the company. Soon thereafter the company started the manufacture of mechanical goods, particularly belts and rollers, and today is one of the largest manufacturers of such products. In addition to guiding the destinies of his company, Mr. MacMillan also found time to take part in both civic and national affairs. He has also won some recognition as a collector of antiques.

Lord Seizure Challenged

Thomas Lord, vice-president of the Lord Manufacturing Co., Erie, Penna., has filed suit in the U.S. District Court charging Lt. Comdr. N. H. Collisson, the Navy's officer in charge of the plant, with exceeding his authority in seizing certain company-owned machines, and with being responsible for a decrease in the production of war material. The Navy took over operation of the plant several months ago following a price dispute with the management. In commenting on the suit, which may prove a test case for determining the responsibility of the armed services for management of facilities seized in wartime, Lt. Comdr. Collisson denied that production has fallen off since the Navy took over the plant, and claimed that production quotas have been exceeded with considerably fewer workers than employed in the plant at the time of seizure. Following filing of the suit, Mr. Lord, who had been retained as a consultant by the Navy in operation of the plant, was dismissed on the grounds of "indifference to duty."

Melting of Crystalline Rubber

The effect of hydrostatic pressure on the melting of crystalline rubber has been the subject of a recent brief investigation at the U.S. National Bureau of Standards, Washington, D.C., extending to pressures above 1,000 atmospheres. With a particular sample of stark rubber, it was found possible to raise the temperature of melting, as determined by the disappearance of birefringence, from about 36° to 70° C. by the application of a pressure of 1,170 bars ($1{,}170 \times 10^6$ dynes/cm^2). The results, including observations at intermediate pressures, can be represented adequately by the equation $\log_{10}(p+1300) = 5.9428-(875/T)$.

LOS ANGELES NEWS

The big event in Los Angeles this past month was the annual outing. Held at the Uplifters' Club in Santa Monica on July 21 and 22, the outing this year took the form of a Spanish Fiesta. With approximately 125 members and guests in attendance, and by far the largest list of prizes yet assembled for such an occasion, the Fiesta was regarded as the most successful outing yet held by the Los Angeles Rubber Group.

Unusual interest was given to the outing by several ingenious devices, including the exclusive use of Mexican money. The variety and elaborateness of the Spanish costumes worn by all of those attending heightened the gala atmosphere. Supper, breakfast and lunch was served, breakfast being the major event of the three, with radio entertainers furnishing fun to aid the early morning digestion. Talent was also supplied by the Raoul Ramires Dance Studio. The estimated cost of staging the Fiesta was placed at $2,500.

As usual, chief interest lay in the various contests, including one in which the contestants had to guess at the life of a burning candle. Winners of the numerous events, in order of their placing, included the following: *Best Costumes*—Sid Pike, Wilfred Berg, Carroll Walker, Vic Vodra, Bob Miller; *Ping Pong*—Bert Biheller, B. R. Snyder, John Easton, Charles Churchill; *Archery* — Willys Blount, Vic Vodra, Earl Hutchinson, Gil Dohm; *Golf Pitch*—Deke Maddy, Page Parker, W. Higbee, Paul Wineman; *Horseshoes*—Page Parker, Curtis Wolters, Leonard Boller, Paul Wineman; *Darts*—T. Kirk Hill, John Easton, A. H. Subrin; *Bean Game*—Charles Sickles, Joe Wildman, Ray Carlson; *Guessing Contest* — Karl Faulhaber, Mason Paine, W. L. Carver.

The success of the outing was due to the unstinted effort of the officers of the Group, ably assisted by numerous aides. George Steinbach and Vic Vodra did yeoman work on handling the reservations, while others indulged in miles of leg work in gathering the prizes and arranging the details. Photographers were on hand, and both stills and movies were taken. The movies will be shown at the first regular meeting of the Group in the Fall, while some of the stills will be reproduced in the next issue of RUBBER AGE.

The contest and door prizes and the entertainment were made possible by contributions from the following firms: American Turpentine & Tar Co., Barrett Division, Binney & Smith Co., L. H. Butcher Co., Godfrey L. Cabot, Inc., T. A. Desmond & Co., Marshall Dill Co., Dill Manufacturing Co., B. E. Dougherty Co., DuPont, Farrel-Birmingham Co., Firestone Tire & Rubber Co., General Atlas Carbon Co., B. F. Goodrich Co., Goodyear Tire & Rubber Co., C. P. Hall Co., W. C. Hardesty Co., J. M. Huber, Inc., Hycar Chemical Co., Kay Trucking Co.

Also A. Legman & Son Truck Co., Marine Magnesium Products Co., Monsanto Chemical Co., H. Muehlstein & Co., Naugatuck Chemical, Ohio-Apex, Inc., Reinke, Hiller & Amende, E. L. Royal, H. M. Royal, Inc., A. Schrader's Son; A. Schulman, Inc., Sharples Chemicals, Inc., Shell Chemical Co., Sierra Talc Co., Stamford Rubber Supply Co., Stanco Distributors, Inc., Standard Chemical Co., Stauffer Chemical Co., Thiokol Corp., Titanium Pigment Corp., Tri-Angle Tool & Machine Works, United Carbon Co., U. S. Rubber Co., R. T. Vanderbilt Co., Wesp, Meldowny & Martin Co., Western Insulated Wire, Inc., C. K. Williams & Co., Chas. T. Wilson Co.

It is anticipated that the Second Annual Industrial Exposition for Southern California, to be held in the Pan-Pacific Auditorium, Los Angeles, September 1 to 9, will see several southern California rubber products on display. The Exposition which was first held last year proved to be a splendid success, products of various California industries being shown and demonstrated to large crowds.

Vic Vodra, who has been West Coast representative for R. T. Vanderbilt Company, Inc., since 1940, has resigned his position to become general manager of the Griffith Rubber Mills, 2439 NW 22nd Avenue, Portland, Oregon. He is being succeeded by Bill R. Snyder, formerly chief chemist for the W. J. Voit Rubber Corporation.

The company that Mr. Vodra will manage in Portland was established thirty-nine years ago for the purpose of manufacturing paper mill rolls, which has been the chief item of manufacture ever since. Right now a big expansion program is under way involving more than a third of a million dollars, pouring of concrete for a fine new building being done at the present time. Occupancy of the new building is slated for the first of the year.

When going full tilt the company will employ 125 workers in each three shifts, and the new building will afford plenty of room for efficient operation. Products will be paper mill rolls and other heavy industrial rubber goods, including products for ship repair work, paper mill maintenance, and other such major items. Cement will also be manufactured on a large scale.

Zina A. Wise is vice-president and was general manager, but he will now devote himself quite largely to sales promotion work.

Mr. Vodra is a graduate in chemistry at the University of California in Los Angeles (U.C.L.A.) and was employed by other major rubber manufacturers before going with Vanderbilt. He is a young man and has made remarkable progress in his chosen profession.

Some of the assorted prizes which were distributed at the two-day "Fiesta" outing of the Los Angeles Rubber Group, held on July 21 and 22.

Walter E. Head, who until recently served as factory manager for the B. F. Goodrich Company in Los Angeles and who recently went to Akron to a position in the home plant, has now been named manager of the Goodrich $6,000,000 tire plant at Miami, Oklahoma. The Miami plant was constructed to meet wartime needs for rubber.

The Los Angeles rubber industry, which already ranks second in the United States, is to be enlarged further, a fact which was assured when Rubber Reserve authorized appropriations for the installation of a new synthetic latex production unit at the government synthetic rubber plant, 192nd Street and Vermont Avenue. The plant is operated by U. S. Rubber Co.

"At present," says a U. S. Rubber official, "we are shipping 50,000 gallons of latex per month from the plant, but on completion of the new program we shall be turning out 150,000 gallons per month." He pointed out that the latex production unit would provide sufficient quantities of certain types of rubber to supply the needs of the entire Pacific Coast rubber products industry and he prophesied that numerous small plants with an assured supply of latex are certain to start up.

Engineering work is already being done on the new unit and it is anticipated that production should get under way at the end of the year.

F. S. Carpenter, manager of the synthetic rubber plant operated by U. S. Rubber Company, and a resident of Pasadena for some time, has been transferred to the company's plantation division, with headquarters in New York City. Philip E. Rice, manager of the chemical plant (Naugatuck) has been selected to succeed him. Mr. Carpenter has always been active in civic affairs both in Los Angeles and in Pasadena. He is a member of the Los Angeles Chamber of Commerce and a director of the Southern California Advisory Council of the National Association of Manufacturers.

Leo T. Keefe, of the Southwestern Rubber Company, spent some time in the hospital during the past month.

Witco Activities in England

Witco Chemical Co., Ltd., British subsidiary of Witco Chemical Co., New York City, has opened a branch office in Manchester, England, under the management of H. F. Schofield, according to C. C. Hallett, managing director of the English firm, who is currently visiting this country for the first time since the war. Mr. Hallett also revealed that the main offices of the company in London were temporarily moved during the war years, when the government took over the building for military purposes. The company expects to return to its original offices as soon as they are vacated.

Surplus Property

Included among forty-eight surplus war plants and sites that are available for sale or lease offered by the Reconstruction Finance Corporation on July 15 are 846 acres in Gary, Indiana. This offering covers land and uncompleted construction, but no buildings. The site was originally intended as a butadiene plant to be operated by Rubber Synthetics, Inc., and was one of the first such units cut back after the all-out synthetic rubber program was launched. The cut-back was announced shortly after ground had been broken for the construction of the plant.

Okonite Personnel Changes

E. J. Garrigan, formerly vice-president and factory sales manager of the Okonite Co., Passaic, N. J., with which he has been associated since 1924, has recently been appointed vice-president in charge of sales. In this position, he will be responsible for sales activities both of Okonite and its Hazard Insulated Wire Works Division, as well as those of the Okonite-Callender Cable Co., Inc. C. E. Brown, Jr., formerly vice-president in charge of the company's Washington, D. C., office, has been appointed vice-president and general sales manager to coordinate the activities of the executive offices with those of the company's 18 branch offices. He will also take over the duties of the late W. K. Vanderpoel as contact executive between the officials of the power and light utilities and Okonite's utility specialists in branch offices. Mr. Brown has served Okonite since 1919.

Build Largest Airplane Tire

An airplane tire, said to be the largest and heaviest ever built, has been manufactured by the Goodyear Tire & Rubber Co., Akron, and is now undergoing Army tests at Wright Field. Measuring 110 inches in overall diameter, the tire is 44 inches across the beads and 36 inches from one sidewall to another. The tube alone weighs 250 pounds and the completed tire with its rim and tube weighs 2,600 pounds. More than 735 pounds of rubber and 420 pounds of fabric are used in the tire, and nearly seven miles of bead wire, or approximately 75 pounds, are required. The services of two men working 72 hours are employed in building the tire, which has a total of 34 plies.

Some literature describing the use of Thiokol FA in the manufacture of liners of rough bore suction discharge hose has been made available by the Thiokol Corp., Trenton, N. J. Ask for Technical Service Bulletin No. 27.

Shell Oil Sponsors Test

In cooperation with the General Tire & Rubber Co., the Shell Oil Company has begun testing 212 specially manufactured synthetic rubber tires containing Dutrex, Shell's relatively new plasticizer. The tires are being tested on Shell cars and trucks in all sections of the country, each tire being recorded by number. Each tire has two half-treads exactly fitted together on the circumference, the tread of one half containing Dutrex. The points of separation are plainly marked and without knowing which half is which the drivers will take five tread depth readings for each half, average them, and enter the two averages on the individual tire's record. In addition to depth measurements, which will be taken every 5,000 miles, examinations and reports for cracks, cutting or chipping on the tread, cupping of the tread, and sidewall breaks will also be made. Results of the test will be made available at a later date.

Snyder Joins Vanderbilt

B. R. Snyder, of 147 No. Hamilton Drive, Beverly Hills, Calif., succeeds Vic Vodra as technical service representative of the R. T. Vanderbilt Co., Inc., on the Pacific Coast on September 1. Mr. Vodra will shortly join the Griffith Rubber Mills, Portland, Oregon, as general manager. Mr. Snyder, the new representative, is a graduate in chemical engineering from the University of Colorado. After being graduated, he served for about three and one-half years with the Gates Rubber Co., where his duties were primarily in connection with compounding for various types of rubber products. For the past three years he has been chief chemist in charge of compounding for the W. J. Voit Rubber Corporation in Los Angeles.

Develop New Plasticizer

A new organic plasticizer, which when added to rubber enables it to remain flexible at extremely low temperatures, has been developed by the Battelle Memorial Institute, Columbus, Ohio, under the sponsorship of the C. P. Hall Co., Akron. The new plasticizer is expected to be especially suitable for use in the manufacture of rubber for de-icers, fuel hose, and self-sealing gasoline tanks. It can be used in both synthetic and natural rubber, but is best suited for use with oil-resistant rubbers of the acrylonitrile type. The plasticizer is scheduled for early production and distribution by the C. P. Hall Co.

Widely used for metering water at ordinary temperatures, the Builders Propeloflo Meter, a product of Builders-Providence, Inc., Providence 1, R. I., is now available at no extra cost for metering hot water up to 250° F. A special high temperature grease is employed for efficient lubrication.

CANADIAN NEWS

Minor building operations now in progress at two of the Kitchener, Ontario, plants of the Dominion Rubber Co., Ltd., are but preludes to a major construction program slated to get under way shortly, according to A. W. Hopton, vice-president. Although Mr. Hopton gave no details as to the proportions of the new building program, he indicated it would run over $1,000,000 in cost.

It was also revealed that the company's Merchants Rubber Factory is planning the expenditure of approximately $66,000 for a new addition to house a new Banbury. F. G. Meunier, factory manager, believes that the new addition will be ready for use some time in November.

The probability that Dominion Rubber would enter extensively into the plastic production field in the near future has also been indicated by Mr. Hopton, who stated: "We have been producing small molded plastic items for automotive parts and we are feeling our way in the plastic field." He emphasized the point that the company will definitely continue as a supplier of molded plastic parts, but the extent of expansion of such production lies in the future. Mr. Hopton would not confirm reports that Dominion Rubber is planning a new plastics plant in Kitchener.

Although commercial travellers can now obtain tires, there is little if any change in the rubber situation due in large part to shortage of labor, George W. Sawin, president of the B. F. Goodrich Rubber Company of Canada, Limited, reported on July 20. The number of men being released from the armed services for rubber production is not sufficient to warrant any relaxation in the direction of civilian consumption.

"If we could get our production up there might be a chance of a slight relaxation in tire restrictions affecting civilians by the end of the year, but right now the picture is far from promising," Mr. Sawin said. He declared his company has had some response to applications for release of experienced rubber workers from the armed services but the return to industry of armed service personnel is far below expectations.

Mr. Sawin could not predict what effect the latest National Selective Service order, with respect to building mechanics in war plants, will have on rubber production. Release of these men from the Goodrich plant has not been noticeable yet. Any transfer of men from rubber production will necessarily cut into output.

Ira G. Needles has been appointed a vice-president of the B. F. Goodrich Rubber Co. of Canada, Limited. Mr. Needles, a veteran of almost 30 years of service with the organization, has been assistant to A. H. Williamson, former rubber controller of Canada. In his new position Mr. Needles will hold the important post-war job of being in charge of all replacements, original equipment and export tire sales, including accessories, miscellaneous merchandise, repair materials and batteries.

Mr. Needles graduated from Northwestern University, Evanston, Illinois, in 1915, and spent a further year specializing in business administration as manager of the employment bureau of the university. He joined the Goodrich organization in 1916, and spent the next two years in the sales school at Akron, Ohio. Following that he spent two years in New York as personnel manager, another year in the sales school, and then four years in the sales promotion department in Philadelphia. In 1925 he came to Canada as assistant to the sales manager, and in 1930 he became sales manager of the tire division.

His sound technical knowledge of the tire business resulted in his being called to Ottawa in 1942 where he took over the post of technical adviser to the rubber controller. His role was an important one, particularly in the field of tire rationing. His services are still utilized by the Government in an advisory capacity, and his exhaustive knowledge of the synthetic rubber industry marks him as a key man in Canada's future progress in this war-born enterprise.

W. H. Funston, president of the Firestone Tire & Rubber Company of Canada, Ltd., announces that T. M. Mayberry and J. H. Forman have been appointed vice-presidents of the company and R. L. Raycroft general sales manager. All three men are natives of Canada.

Mr. Mayberry joined Firestone seventeen years ago and has served with the sales and treasury departments in various territories with the parent company. Coming to the Canadian company in 1934, he was appointed treasurer, a position which he still retains with his new appointment as vice-president.

J. Herbert Forman has been with Firestone for 25 years. On the completion of the Firestone plant at Hamilton in August, 1922, he was put in charge of labor and production. In 1928 he was made factory superintendent and is now vice-president in charge of production.

Mr. Raycroft started with Firestone in 1923 as a general line salesman. Three years later he was promoted to manager of truck and bus tire sales and in 1928 was appointed manager of manufacturers' sales, which position he has held ever since. For the past six years he had the added responsibility of being in charge of Firestone war products.

The 5,170 shares of 5% preference stock of $50 par value of the Goodyear Tire and Rubber Co. of Canada, called for redemption on August 4 at $52.50 a share and accrued dividend of 25 cents a share, will be the largest block of the shares redeemed in any one year by the company, and almost equal to the total shares redeemed through sinking fund since the issue was sold to the public in 1935.

Under the sinking fund the company has the right to purchase the shares in the market at a price not exceeding $52.50 and accrued dividend, and if not possible to purchase at this price the available funds are put into a redemption reserve and when this redemption reserve exceeds $250,000 the reserve is to be applied for the redemption of preferred shares at the call price by drawing by lot. The price of the stock is well above the redemption price so that it was necessary to draw by lot the shares to be retired.

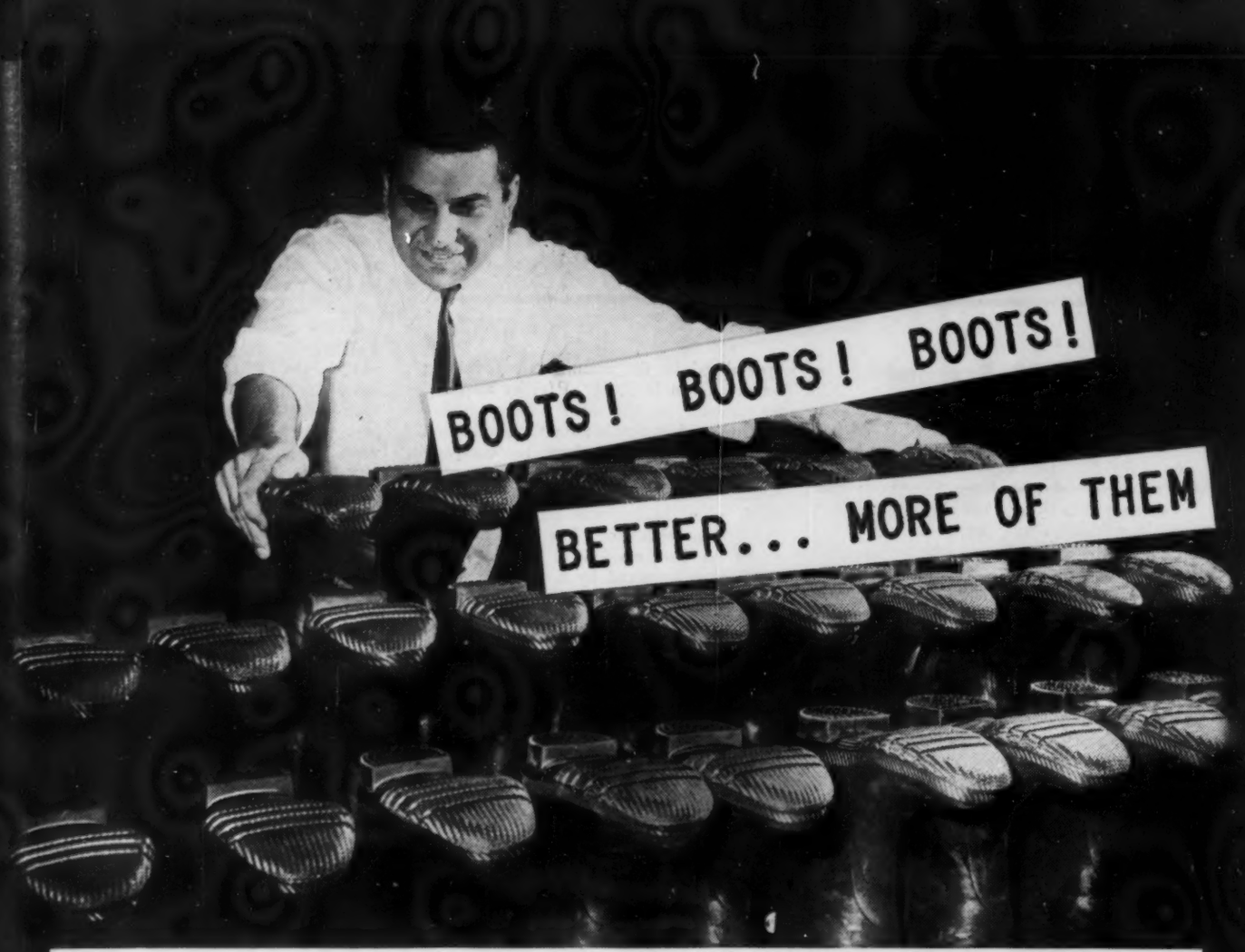
Installation of additional equipment, including a Banbury mixer, is planned at Kitchener, Ontario, by the Kaufman Rubber Company for next year. An addition to the rear of the plant will be required to accommodate the expansion of activities. A. R. Kaufman stated construction will likely be scheduled for next spring when, he hopes, difficulties hampering construction will be considerably reduced.

The new addition will be six stories high and will measure 40 by 100 feet. Mr. Kaufman did not go into construction details so far in advance of starting the project. The Banbury mixer will take up three stories of the addition and the remaining floor space will provide for installation of additional equipment. The net result will place the company in a position to increase production.

Announcement of the creation of the B. F. Goodrich Chemical Co. of Canada, Ltd., to handle the sale of Geon, rubber chemicals, synthetic rubbers, and allied materials, has been announced by the parent Canadian company. The new company will include H. P. Hawkins as general manager and Duncan Douglass as general sales manager. Sales and technical offices will be located at 251 King St., West, Kitchener, Ontario.

The Canadian Triangle Wire & Cable Co., Ltd., has moved its plant and offices to new and larger premises at 4006 Dundas Street, West, Toronto, Ontario. The new plant provides added space for the more efficient manufacturing of the company's line of electrical wires, cables and conduits. The new telephone number is Junction 1153.

Sales of the Canadian Tire Corporation increased about 25% in the first four months of 1945 as compared with the similar period of 1944 and are expected to be up 20 to 25% for the year, depending on merchandise available.



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OBITUARIES

Charles B. Raymond

Charles B. Raymond, former vice-president of the B. F. Goodrich Co., Akron, died in Santa Barbara, Calif., on July 29. He was 79 years of age. Mr. Raymond was born in Akron on February 12, 1866. After attending the city's public schools, he matriculated at Amherst College, from which he was graduated in 1888. The same year he joined Goodrich as a clerk, and in 1890 he married Mary Perkins, daughter of the company's second president. By 1910 he had become secretary of the firm, and in 1921 he was advanced to vice-president and vice-chairman of the board. In 1928 he retired, because of ill health, and moved to Santa Barbara, but continued to serve as a director until 1933. Active in civic affairs, Mr. Raymond served at various times as president of the Akron Chamber of Commerce, president of the board of the Akron Y.M.C.A. and City Hospital, a member of the Board of Education, a trustee of Kenyon College, head of the American Red Cross in Akron, and was a founder of the Portage Country Club. He is survived by a widow, two sons and a daughter. Burial was at Santa Barbara.

George Friedman

George Friedman, manager of the Boston, Mass., office of H. Muehlstein & Co., and associated with that company for some forty years, died on August 6 at the age of 54. Closely associated with Herman Muehlstein, head of the scrap rubber concern which bears his name, Mr. Friedman was widely known in scrap and reclaimed rubber circles. He was a familiar figure at local and national rubber meetings and his advice on scrap problems was eagerly sought. Mr. Friedman leaves a widow, Mrs. Victoria Friedman, and two sons, Sidney, who is associated with the Akron office of the Muehlstein organization, and Norman, who recently returned to school after being honorably discharged from the Army.

Jacob Pfeiffer

Jacob Pfeiffer, former president of the old Miller Rubber Co. of Akron, died in a hospital at Miami, Florida, on July 29, at the age of 84. Mr. Pfeiffer was born at Wadsworth, Ohio, and attended the local schools. Afterwards, he moved to Akron, where he worked for several years as a clerk in a drug store and later became a partner. Through this work he became connected with the newly-organized Miller Rubber Co., which specialized in the manufacture of drug sundries. In 1892, Mr. Pfeiffer acquired an interest in the firm. Through his invention of equipment for the production of a seamless rubber glove, the company prospered, and in 1898 he became president. This position he retained until 1930, when Miller was acquired by the B. F. Goodrich Co. For the past five years he had resided in Miami. Mr. Pfeiffer is survived by a widow. Services and burial were in Miami.

The rapid growth of new chemicals and the widening industrial use of well-known ones, especially during the war, has led the Division of Labor Standards of the U. S. Department of Labor, Washington, D. C., to inaugurate a series of bulletins on controlling chemical hazards. The first bulletin, now available, covers ammonia.

Goodyear has completed arrangements to take over operation of the plant of the Steel Storage File Company in Wooster, Ohio. The plant, operated by Seiberling Rubber for the past several months, will be used to manufacture special life-saving devices.

Acquisition of the B. F. Sturtevant Co., Boston, Mass., pioneers in the design and manufacture of air handling and processing equipment, has been announced by the Westinghouse Electric Corp. It will continue in operation as a Westinghouse division.

The National Water Finder, which safeguards deliveries of gasoline, fuel oil, and diesel and tractor fuel, by clearly indicating the presence of water in tanks containing petroleum products or other liquids which float on water and which are insoluble in water, has been made available by the Metal Hose & Tubing Co., Dover, N. J.

Lump material of neoprene compounded with aluminum oxide abrasive, for use in tumbling operations, is being manufactured by De Burr Barrel Co., 4557 Hollywood Blvd., Los Angeles 27, Calif. It is available in three sizes and in hard or soft grades.

A new synthetic rubber hose said to withstand temperatures up to 300° F. and to have pressure resistance double that of hose previously manufactured has been developed by U. S. Rubber for use in the lubrication and cooling systems of airplanes.

Dunlop Exhibits War Products

Included among rubber products exhibited by the Dunlop Rubber Co., Ltd., at a special showing of wartime goods in London recently, was a pneumatic wave controller, believed to be the largest single inflatable rubber unit ever manufactured. The unit is 200 feet long, 25 feet high, and weighs 700 tons. A number of them were manufactured for controlling the waves on the Normandy beachhead. Set in a line, these units reduced a six foot wave to approximately one foot. The Franks Flying Suit made by the company was also shown. This suit, which increases the pilot's resistance to "blackout," has a rubber bag interlining. Another exhibit was an inflatable suit which covers the body completely except the face. It is made of rubberized fabric and when blown up weighs but 2½ pounds.

Clorafin 42 and 70 Available

Hercules Powder Co., Wilmington, Del., has announced that Clorafin 42 and 70, its flame, weather and waterproofing compounding ingredients, have been taken off allocation. Clorafin 42 is a viscous, nonflammable liquid plasticizer and is soluble in a wide range of solvents. It is compatible with a wide range of chemical and oil plasticizers, waxes, and resins, and is used as a plasticizer for vinyl copolymers. Clorafin 70 is an amber-colored non-flammable solid resin with a comparatively high melting point. It is compatible with other plasticizers, waxes and resins. Fabrics treated with the Clorafins are said to be color-fast, flexible, stable in water, resistant to high and low temperatures, and free of objectionable odors.

Detroit Meets September 13

The next meeting of the Detroit Rubber & Plastics Group will be held on Thursday, September 13, at the Detroit-Leland Hotel, in Detroit, Mich. Fred Conover, of Naugatuck Chemical, will be the principal speaker and will discuss "Synthetic Latex." Other features are being planned for the meeting.

Eronel Firefoil, a waterproof, fungus-resistant, non-inflammable plastics coating material, which can be applied to fabrics by dipping or spraying methods or with roller coaters, spreaders or brushes, has been introduced by Eronel Industries, 5714 W. Pico Blvd., Los Angeles 35, Calif.

Liquid inflation may be used in place of air for tires on certain types of industrial equipment, such as road graders, power mowers and industrial tractors, according to Goodyear, which has made extensive tests on a method of filling tires with its Solution 100. Approval has been given the use of Solution 100 in tires of vehicles which carry only the weight of the vehicle and travel at relatively slow speeds.

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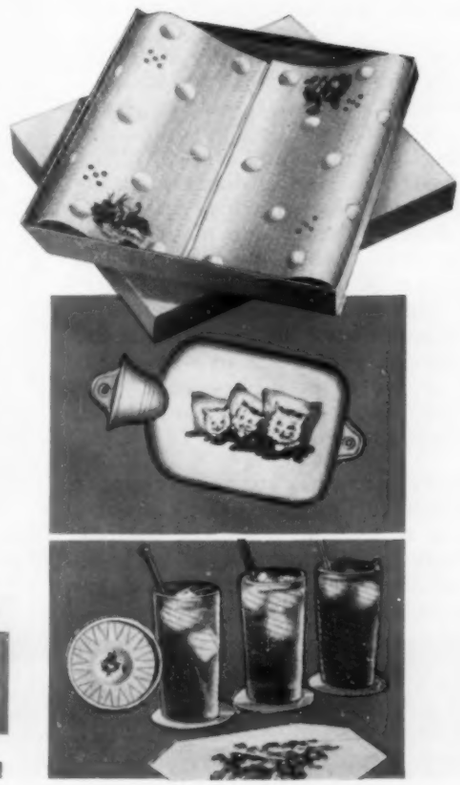

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PLASTICS

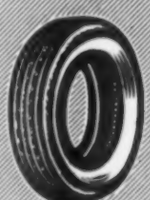
THE Schuster
MAGNETIC CALENDER GAUGE
SAVES THAT MATERIAL

For upwards of 15 years, the Schuster Magnetic Calender Gauge has unerringly set rubber calender rolls to a predetermined thickness and correctly maintained that thickness. It has saved the time of hand-miking, eliminated human error, saved the stock sampled for calender tests, and assured uniform thickness in the finished product.

All this, *at the right time—before* damage is done. And *continuously*—the only way worth while.

The instrument is simple in design . . . rugged in construction . . . practically without wearing parts . . . adjustable to any thickness. Originally used for rubber, it has taken over just as deftly for synthetic rubber, plastics, cellulose, and other media. No matter what the article, your coating must be thick enough, but not even 1/1000" too thick, or the war effort suffers irreparable loss. No matter what the material, you've got to s-t-r-e-t-c-h it as far as possible—and "possible" daily proves to have a new, elastic meaning.

Better investigate the Schuster Magnetic Calender Gauge at once, with or without automatic control. Every installation has to be engineered to the job . . . Please *give us time to do it right.*



Ask for our bulletin on the Schuster Magnetic Gauge.

THE MAGNETIC GAUGE COMPANY
60 EAST BARTGES STREET AKRON, OHIO
Eastern States Representative—
BLACK ROCK MANUFACTURING CO., Bridgeport, Conn.

NEW EQUIPMENT

Paragon Interval Timer

An interval timer, specially designed for use in the molding of rubber and plastics, is now being offered by the Paragon Electric Co., 37 W. Van Buren St., Chicago 5, Ill. The device is operated and timed by a Telechron self-starting motor. Ten time ranges are available, ranging from ¼ second minimum to 20

hours maximum. An outstanding feature is said to be the ease of operation. The time pointer is set to the desired program, then the timer starting switch is put into operation. At the end of the pre-set time, the pointer returns to zero, automatically lighting a bull's eye signal light or operating a built-in buzzer.

Bristol Potentiometer Controllers

A new series of electric-type potentiometer controllers has been announced by the Bristol Co., Waterbury 91, Conn. Five basic control unit types are available. Three are electric contact types, to be known as the Microact controllers, and the other two are electric proportioning and current input types. The control units are mounted on the internal panel of the Bristol Pyromaster potentiometer recorder, and any type may be readily converted to any other type. The three Microact units are provided with one, two, and three precision-type toggle switches, respectively, and six different terminal board connection arrangements to meet a wide assortment of control circuit requirements. Proportioning controllers may be used with any type of electric proportioning valve, and may be had with resetting contacts if required. The proportional input controller is primarily designed to provide close temperature control of electric furnaces and ovens.

The C. P. Hall Co.
CHEMICAL MANUFACTURERS

ACCELERATORS

PLASTICIZERS

ANTIOXIDANTS

A Complete Line of Approved Compounding Materials

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"No! No! A Thousand Times No!"

That's what they all say! After we install a Stanford Automatic Web Guide on a free trial basis (something we'll be glad to do for *you*, in *your* plant) it would be easier to snatch a bone from a hungry tiger than to remove our Guide from that plant.

After all, the Stanford device actually can and does hold trim or weave to within 1/16" plus or minus, and if you'll phone, wire, or even write for a free, no-obligation trial installation in your plant, we'll *easily* prove that statement!

Phone, telegraph or write for a demonstration—or for further information, as you prefer.

Stanford
AUTOMATIC
WEB GUIDE

"You can't afford to be without a Stanford"

STANFORD ENGINEERING CO.
SALEM, ILLINOIS TORONTO, CANADA

ElectroniK Contact Controller

The Brown ElectroniK Contact Controller, which features a new safety emergency alarm for the protection of process equipment and materials, has been introduced by the Brown Instrument Co., Philadelphia, Penna. The controller, which operates automatically, provides on-off control, in addition to air control to actuate motorized valves, solenoid valves, contactor

panels, signal lights, etc. As shown in the accompanying illustration, contacts (A) and (B) are made or broken by the action of cam (C) and roller (D), and the spring loaded lever to which it is attached. The control point is set by loosening the knurled knob (E) and rotating cam (C), so that its notch corresponds to the position of the temperature pen that has been previously moved to the desired point. The pen position sounds the emergency alarm. A red pointer on the scale indicates the temperature setting of the contact controller.

Bristol Running-Time Recorder

A new instrument for checking machine performance by recording machine running-time has been developed by the Bristol Co., Waterbury 91, Conn. The instrument records the operating or "on" time of production machinery and other similar equipment on a chart, which gives the total "on" time in hours, minutes and seconds for a given period. Likewise, "off" periods are shown, with the time at which they occurred. The running-time readings are magnified in such a way that the total operating time of a machine can be easily and accurately determined to within a few seconds.

The Watson-Stillman Co., Roselle, N. J., has introduced a new **semi-automatic compression molding press,** which may be used for either straight compression molding or by the transfer method. The press is available in capacities from 50 to 1200 tons.

Plastic Suction Pump

Speare's Safety Pump, a new hand-operated suction pump built of an inert plastic, has been announced by the Alden Speare's Sons Co., Cambridge 42, Mass. Designed primarily for the safe handling of acid, it is used with acid carboys of from 5 to 13 gallons capacity, and is said to withstand immersion in practically all

grades and kinds of commercial acids. Quickly and easily installed, it eliminates the hazard of juggling heavy carboys. As the plastic is unaffected by alcohols, oils or water, the pump also has a wide range of usefulness in transferring liquids from barrels or drums where attack of the liquid on a metal pump would cause undesirable contamination.

FOR EASY PROCESSING USE PHILBLACK A

(FOR FURTHER DETAILS SEE AD ON PAGE 498)

So sensitive to fire is "Automatic" FIRE-FOG that a mere wisp of flame is sufficient to bring action, immediate and decisive. This system of fire quenching converts water into a fine mist. It operates on the principle of quick response to heat—there's only a lapse of seconds between a blaze and its extinction. With FIRE-FOG nozzles strategically placed to cover every vulnerable area, absolute protection is assured. FIRE-FOG is entirely automatic in operation.

In addition to guarding rubber churns, FIRE-FOG is providing positive protection for oil quench tanks, enamel dip tanks, oil filled electrical equipment, gasoline loading racks and other hazards subject to fires of flammable liquid origin. Write for complete information.

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"Automatic" manufactures and installs a complete line of fire protection devices and systems for all types of fire hazards. Listed by Underwriters' Laboratories, Inc., and approved by Factory Mutual Laboratories.

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REVIEWS

BOOKS

Time Study and Motion Economy for Supervisors. By James D. Shevlin. Published by the National Foremen's Institute, Inc., Deep River, Conn. 5½ x 8 in. 74 pp. $2.00.

This manual presents data to help every supervisor streamline the job operations of his crew. For quick reference and convenient use, the manual is divided into three parts: (1) Motion Economy, which consists of 10 "commandments" of better methods, with detailed explanations of each; (2) Time Study, which describes how a time study is made, discusses the relation of time study and cost reduction, etc.; and (3) Charts and Diagrams illustrating the text. The latter consist of graphic pictures of time and motion studies before and after completion, all printed in four colors. The use of several colors enables quick and accurate grasp of the principles dealt with in the text.

•

Job Safety Training Manual. By Kenneth L. Faist and Stanton M. Newkirk. Published by National Foremen's Institute, Inc., Deep River, Conn. 6½ x 9 in. 70 pp. $5.00.

This loose-leaf manual, based on training methods used in the Training Within Industry programs of the War Manpower Commission, contains complete instructions for conducting a brief and intensive safety training program for foremen and supervisors in every type of job. It is organized to serve as a working tool in conducting five two-hour training sessions, with the aim of eliminating the need for involved preparations. Three supplements for use at specific points in the training sessions to deepen, enlarge and fix the technique of safety which trainees are supposed to have demonstrated visually, orally and manually during instruction, are included with the manual.

BOOKLETS, CATALOGS, Etc.

We Had to Have Rubber. Issued by the Rubber Manufacturers Association, Inc., 444 Madison Ave., New York 22, N. Y. 6 x 9 in. 64 pp.

This booklet represents another forward step in the work being done by the R. M. A. to acquaint industry in particular and the public in general with the war effort expended by the rubber manufacturing industry. The story is told pictorially, with action photographs showing rubber in action in various war theatres. Picture charts are used to show typical production statistics. The entire gamut of rubber products is run, from sundries to tires, with production figures given for many of these products. Some 50,000 of these booklets are being distributed. In addition, the R. M. A. is offering additional copies at a cost of $150 per thousand, f.o.b. New York City.

•

Dutrex 20 and 25. Shell Oil Co., Inc., 50 West 50th St., New York 20, N. Y. 8½ x 11 in. 14 pp.

Some further data on the use of Dutrex 20 and 25 as plasticizers for the vinyl chloride resins is contained in this revised booklet. The compatability of these plasticizers with polyvinyl chloride is first discussed and data is then furnished on various compounds, information being furnished on mechanical properties, brittle temperature, volatility, extraction loss, flammability and aging. Test methods used are outlined.

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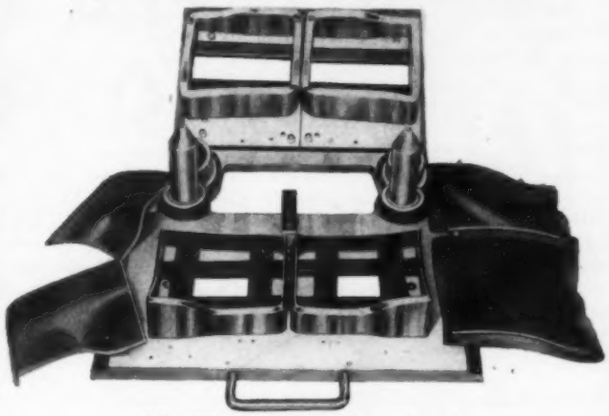
Also TOOLS, DIES, JIGS, FIXTURES, MOLDS and MACHINE PARTS



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Sifters, Crushers, Cutters, Dry and Liquid Mixers, Mills, Grinders, Pulverizers, Conveyor Systems, Complete Installations.

The handling equipment construction "know-how" of the Mercer Engineering Works, Inc., Clifton, N. J. . . . The more than 40 years processing equipment experience of Robinson Mfg. Co., Muncy, Pa. . . . All are embodied in and represented by

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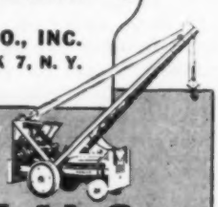

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Trailer Trucks (All Types) Wheel Tractor Cranes (3 to 7 ton) Fork Lift Trucks, Lift Platforms, Hoists, Live Skids, Wheels, Casters.

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KNOB OPERATED VALVE SHOWN

Valvair valves are new in design and principle, standard valves have been operated more than two million times without leak with air pressure exceeding 100 lbs. They are designed for indefinite life and exceptionally hard service.

They are compact—they do not have metal seals—the body is made of cast bronze and steel parts are made of stainless steel—they will not corrode.

They are made in five sizes—¼, ⅜, ½, ¾ and 1 inch—and in two-way, three-way and four-way types. They can be furnished in eight or more different designs—knob, lever, foot, cam, clevis, single diaphragm, double diaphragm or solenoid operated.

They will control air efficiently up to 200 lbs. pressure with a very light movement. The area through the valves is equivalent to pipe size with minimum pressure drop. Write for literature.

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PLUNGER CANS

FOR CLEANING and SPONGING WITH FLAMMABLE LIQUIDS

SAFEGUARD AGAINST FIRE. Far better, cleaner, and safer than common practice of dipping a swab into an open can. Protectoseal Plunger Can has spring-mounted dasher. Pressing down with swab on dasher automatically pumps fluid from well to moisten swab. Excess liquid drains back through tube to can. In case of fire, ignition of vapors above double perforated-metal fire baffle in dasher will not reach contents of can. Fire burns out quickly.

FAST AND EFFICIENT. Moistening of swab is accomplished in one quick easy motion. Waste of liquid is reduced to a minimum because amount of dampening can be metered by length of stroke. Various sizes of dashers are available for different types of work.

APPROVED. Protectoseal Plunger Cans are approved by Associated Factory Mutuals and are available in 4 sizes from 1-pint to 1-gallon capacity. ***Write today for complete data on the PROTECTOSEAL line of Fire Baffle Fill and Vent Fittings, Safety Cans, Plunger Cans, and Wash Tanks.***

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PROTECTOSEAL

Fungicidal Control of South American Leaf Blight of Hevea Rubber Trees. (Circular No. 686). By M. H. Langford. Issued by U. S. Department of Agriculture, Washington, D. C. 6 x 9¼ in. 20 pp. Available from U. S. Government Printing Office, Washington 25, D. C., at 10c a copy.

This circular sets forth the results of experiments in the treatment of South American leaf blight which have been made in connection with the cooperative intergovernmental program of rubber investigations begun in 1940. After summarizing early attempts to protect Hevea by spraying, the circular describes recent experiments in Panama and Costa Rica, lists the important considerations in the control of leaf blight, and describes spraying and dusting experiments in seedling nurseries in Costa Rica and Panama. Other topics treated include factors affecting control by spraying, the effect of spray residues on budding success, spraying high-yielding clones, spraying trees during the annual leaf-change period, procedures recommended in spraying, and the cost of spraying. A bibliography is appended.

•

Scott Testers. (Catalog No. 45). Scott Testers, Inc., 112 Blackstone St., Providence, R. I. 8½ x 11 in. 54 pp.

This catalog, like its predecessors, is designed to aid the manufacturer or the laboratory in selecting the proper testing instrument for making physical tests on all types of materials. It is divided into four sections, as follows: (1) illustrates and describes many of the various models available for testing tensile strength, elongation, hysteresis fatigue, twist, plasticity flexing, and burst strength; (2) lists the dials available for each instrument for strength tests, giving the combination of capacities and the graduations for each capacity; (3) provides lists of the "Tensilgrams" available for each model, the list for each model being divided into sections for the amount of clamp separation that can be recorded, the size of the Tensilgram, the ratio between the amount of clamp separation and the length of the test line, etc.; and (4) gives miscellaneous engineering data to aid in the selection of the proper instrument and in interpreting the test results.

•

Electron Microscope Studies of Colloidal Carbon in Vulcanized Rubber. By W. A. Ladd. Columbian Carbon Co., 41 E. 42nd St., New York 17, N. Y. 5½ x 7¾ in. 12 pp.

Issued as Vol. V, No. 6, of the "Columbian Colloidal Carbons" series, this study originally appeared in the *Analytical Edition, Industrial and Engineering Chemistry*. Developments in the study of the disposition of carbon black particles in a rubber compound by means of the electron microscope are discussed by the author. In addition, new techniques are described for electron microscope studies of colloidal carbon in vulcanized natural and synthetic rubber. By these techniques, it is hoped, it will become possible to determine the micromorphology of carbon-reinforced rubbers, assess the effect of differences in carbon fineness and structure, evaluate visually the effect of polymer differences upon the ultimate carbon-polymer units, and determine the effect of processing and other variables.

•

DieLess Duplicating. (Catalog No. 45-8). O'Neil-Irwin Manufacturing Co., Minneapolis 15, Minn. 8½ x 11 in. 40 pp.

The latest edition of this catalog contains illustrations and information concerning the latest models of all Di-Acro precision machines, including benders, brakes and shears. Numerous "close-up" photographs showing the machines at various angles, both stationary and in operation, and typical products which they can be used to manufacture, are included.

Decreases **MARKING**
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Our pure cotton "Filfloc" greatly minimizes marking when introduced into sole compounds. It also improves toughness and tear resistance. For use with crude, synthetic and reclaim.

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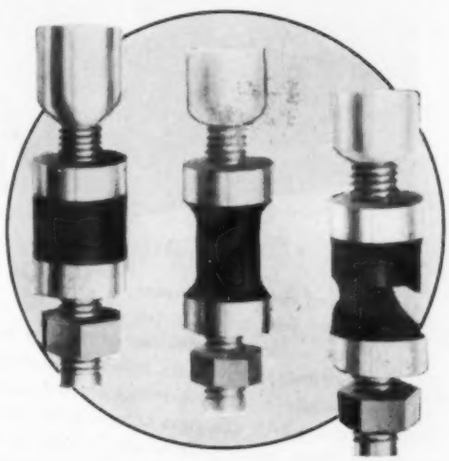
TO BOND RUBBER AND SYNTHETIC RUBBER TO METALS

With Reanite you can forget slow, costly brass plating in rubber-to-metal adhesion. Merely substitute two quick-drying coats of Reanite cement for the brass plating operation and proceed as usual. Follow your standard practice for curing time, pressure and temperature. *Reanite bonds will prove stronger than the rubber itself!*

Reanite will bond natural rubber or Buna S with practically integral adhesion to steel, aluminum, magnesium, copper, in fact almost any metal.



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Please send me full information, without obligation, on the Reanite Process for bonding rubber-to-metal.

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Weathering qualities of
RUBBER PRODUCTS
determined with reliable
accuracy in the

ATLAS *twin arc*
WEATHER-OMETER

Any selected cycle of exposure to sunlight and wetting can be set for automatic continuous testing in the Weather-Ometer. Exact tests can be duplicated at any time by settings on the control panel which contains temperature regulator—time meter—light and water cycle switch — automatic cut-off switch — voltage adjusting switch — direct reading thermal regulator — reactance coil (for economical current consumption). The Weather-Ometer is fully automatic in operation; can be left unattended over night; only necessary to renew carbons once in 24 hours. Years of exposure to any conditions of weathering reduced to a few days testing in the laboratory with the Weather-Ometer.

Originators and sole manufacturers of accelerated testing machines for over a quarter of a century. Fade-Ometer, Weather-Ometer, Launder-Ometer — the accepted standard testing machines used all over the world.

ATLAS ELECTRIC DEVICES CO.
361 West Superior Street, Chicago 10, Illinois

Everywhere in Industry. Hycar Chemical Co., 335 So. Main St., Akron, Ohio. 8½ x 11 in. 20 pp.

This bulletin ably describes the various types of Hycar special purpose synthetic rubbers and their industrial usage. The first part of the bulletin is devoted to a pictorial resume with a discussion of the process by which these rubbers are manufactured, the characteristics of the crude polymers, and the company's engineering services. The latter portion covers the properties and applications of vulcanized compounds of Hycar OR-15, OR-25 and OS-10. Tables showing the complete range of properties, qualitative resistance to various oils and solvents, physical properties of representative compounds, effects of oil and heat aging on physical properties of typical compounds, and effects of prolonged fluid aging on typical compounds, one of OR-15 and one of OR-25, are included.

•

Norelco X-Ray Diffraction Apparatus. North American Philips Co., Inc., 100 E. 42nd St., New York 17, N. Y. 8½ x 11 in. 12 pp.

This booklet describes X-ray diffraction techniques and applications. Diagrams, typical diffraction films, and several tabulations are given to show how the company's diffraction equipment is used for identification, research and production. Special pages are devoted to powder, back-reflection-focusing, and low-angle scatter cameras. The booklet also describes how X-ray diffraction films are interpreted.

•

Northmaster Kneading Machines. Northmaster Division, Struthers Wells Corp., Titusville, Penna. 8½x11 in. 16 pp.

This comprehensive bulletin gives complete details on the new line of kneading machines recently introduced by the company. It includes tables of standard sizes and capacities, mixing chamber and blade types, and complete construction data and available optional features. The kneading machines are available in laboratory, standard and heavy-duty units from 0.12 up to 3600 gallons working capacity.

•

Resistoflex Protective Clothing. Resistoflex Corp., Belleville 9, N. J. 8½ x 11 in. 16 pp.

Transparent garments made of compar, a solvent-proof vinyl resin compound, which are designed to protect wearers against grease, oil, organic solvents, gas, fumes, or dust, are illustrated and described in this pamphlet. Among the exhibits are industrial gloves, caps, aprons, smocks, and sleeve-guards, as well as a coating compound for the preservation of work shoes.

FOR CUT AND CRACK GROWTH RESISTANCE
USE PHILBLACK A

(FOR FURTHER DETAILS SEE AD ON PAGE 498)

TANNEY-COSTELLO CO.

DEALERS AND BROKERS

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SCRAP RUBBER

SYNTHETICS — PLASTICS

We Offer A Service

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COLITE CONCENTRATE

A HIGH QUALITY CONCENTRATED LIQUID MOLD AND MANDREL LUBRICANT—*NON-TOXIC, NON-TACKY, ODORLESS.*

- *Simplifies the removal of cured rubber from the molds.*
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★ **SUPERIOR TEAR RESISTANCE**
★ **HARDNESS and STIFFNESS**

For Details and Samples Write or Wire

MARBON CORP., GARY, IND.

The Story of Plastic Molding. Chicago Molded Products Corp., 1020 N. Kolmar Ave., Chicago 51, Ill. 8½ x 11 in. 24 pp.

This booklet aims to give engineers and production men simple, direct and useful information on the subjects of what plastics are, when or where they should be used, how products should be designed in order to get the most satisfactory use of molded plastics, and which plastic materials should be used. The molding process itself is described, and tables showing the relationship between mold cost and piece part cost and listing the comparative physical properties of various plastic molding materials are included. There are also numerous illustrations and diagrams showing molded plastic products and processes of manufacture, as well as descriptive material and photographs pertaining to the company's facilities.

•

Temperature Control Cabinets. (Catalog No. 325). Precision Scientific Co., 1750 N. Springfield Ave., Chicago 47, Ill. 8½ x 11 in. 48 pp.

This catalog describes and illustrates standard models of the constant temperature control cabinets manufactured by he company, as well as cabinets and baths built to specifications. The standard models include electrically-heated ovens for rubber aging, plastics, laboratory drying operations, preheating and conditioning. Also described are sterilizers, low temperature cabinets, vacuum ovens and combustion-tube furnaces for laboratory use. Some information pertaining to mechanical and gravity convection heat transfer is also included in the catalog.

•

Taber Abraser. Taber Instrument Corp., North Tonawanda, N. Y. 8½ x 11 in. 16 pp.

This illustrated catalog describes a self-contained electrical instrument and accessories manufactured by the company for measuring potential surface wear of materials due to rubbing abrasion. The principal operations for making an abraser test are described, and the range of application of the instrument is discussed. A list of prominent companies which use the Abraser is also included.

•

Fairprene Coated Fabrics. Fabrics Division, E. I. du Pont de Nemours & Co., Inc., Fairfield, Conn. 8½ x 11 in. 12 pp.

This manual contains a discussion, illustrated with charts and graphs, of the properties of fabrics coated with "Fairprene" compounds, and describes the various types produced. A list of applications and a table of physical properties, giving finished width, base fabric, count, total weight per square yard, gauge, tensile pounds, and burst pounds, are also included.

•

Hoggson & Pettis Products. Hoggson & Pettis Mfg. Co., 141 Brewery St., New Haven, Conn. 8½ x 10½ in. 48 pp.

Profusely illustrated, the latest edition of this catalog describes the several products manufactured by the company for use in the rubber and plastics industries, including marking dies and other marking devices, cementing and vulcanizing tools, thickness gages, molds or dies for rubber and plastics, and molds and dies for rubber testing. Also included are instructions for the proper use of these tools.

AIR BAG BUFFING MACHINERY
STOCK SHELLS **HOSE POLES**
MANDRELS
NATIONAL SHERARDIZING & MACHINE CO.
868 Windsor St. Hartford, Conn.
Representatives: Akron San Francisco New York

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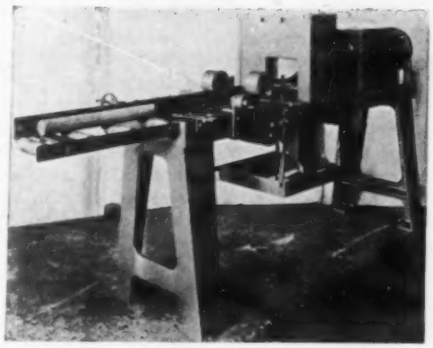

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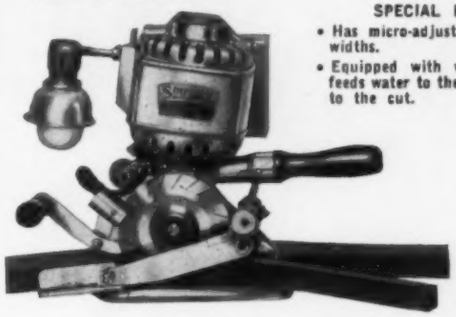
RUBBER STRIP CUTTER

PATENTED

A PORTABLE machine capable of stripping slab rubber up to 1" thick at the rate of 20,000 feet in 8 hours. Any width desired.



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- Has micro-adjustment for accurate widths.
- Equipped with water tank which feeds water to the slotted knife and to the cut.
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- Automatic sharpener device keeps knife keen and sharp.
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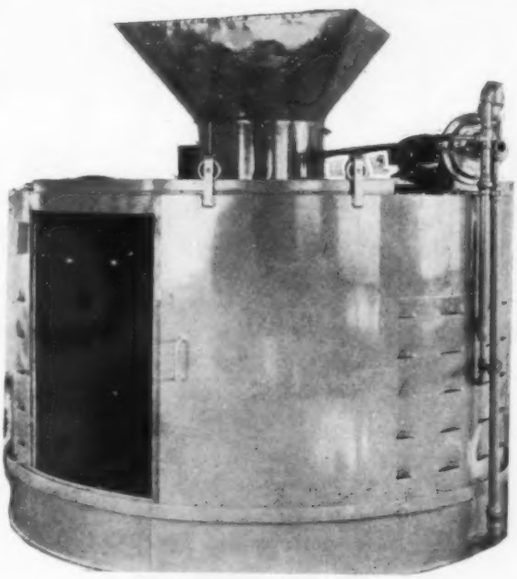
Cuts within 1/64 inch to 1/100 inch tolerance depending on grades of rubber. Cuts a slab down to the last shaving. Cuts all grades of rubber including pure gum, sponge, etc. Cuts squarely—no rejects.

Now in use by many leading Rubber Manufacturers & Jobbers

Simplex Cloth Cutting Machine Co., Inc.

Manufacturers of a Complete Line of Cloth Cutting Machinery
270 West 39th St. New York 18, N. Y.
Cable Address—SIMPLEX, N. Y. *Phone*—WIsconsin 7-5547



RUBBER SLAB COOLER

The mill room equipment at the left is used to lubricate cool and dry rubber slabs having been hand cut from a rubber mixing mill. Do that job for less money, in less floor space with cleanliness around your mills.

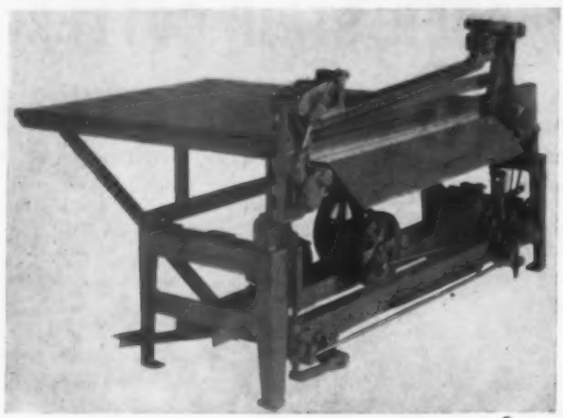
Simple to operate, practically no maintenance or care required.

Set in required location. No anchor bolt necessary. Connect electrical line, water and drain. It is then ready for operation. FURTHER DETAILS UPON REQUEST.

The Akron Standard Mold Co.

Akron — "The Established Measure of Value" — Ohio

ELECTRIC SHEAR



Power driven shear for cutting sheet material up to ½" thickness. Available in light or heavy type in widths from 30" to 100". Hand feed, foot pedal operation. Clamp automatically holds material while being cut. Knife has self-honing action. A clean square cut is assured.

SPADONE MACHINE COMPANY
10 East 43rd St. New York 17, N. Y.
Representatives for ALFA MACHINE CO.

Testing Aids Post-war Planning

The many models of *Scott Testers aid the control of research and production, providing "world-standard" tests for tensile, hysteresis, burst, tear, flexing, twist, adhesion, plasticity, etc. Request Catalog 45.

** Registered Trademark*

SCOTT TESTERS, INC. 85 Blackstone St. Providence, R. I.

SPECIALIZING IN
USED MACHINERY FOR THE **RUBBER**
AND ALLIED INDUSTRIES
MILLS, CALENDERS, HYDRAULIC PRESSES,
TUBERS, VULCANIZERS, MIXERS, ETC.
ERIC BONWITT AKRON, OHIO

MOLDEZE
The Mold Treatment for Plastics and Rubber
"In all our years in the rubber business we never have seen the equal to MOLDEZE" . . . says Chf. Engr. famous rubber firm.
Majority of Leading Firms now use MOLDEZE
Send for 1 long-lasting pint . . . $5 delivered
PROTECTIVE COATINGS, INC., BOX 56RA, DETROIT 27

REVIEWS (CONT'D)

Electrix Equipment. Electrix Corporation, 150 Middle St. Pawtucket, R. I. 8½ x 11 in. 24 pp.

This folder illustrates and describes the various pieces of shop equipment which the company has available for manufacturing purposes. Included are descriptions of lathes, milling machines, drill presses, grinding machines, and laboratory measuring apparatus. This is the equipment which the company utilizes in the production of precision gages, jigs and fixtures, form tools, lamination dies, molds for rubber and plastics, and for miscellaneous production parts. One section is devoted to the soft rubber plugs developed by the company, these plugs being made and sold by the U. S. Rubber Co. Some recent advertisements used by the company to explain its services to industry are also reproduced.

•

Burrell Gas Analysis Apparatus and Manual for Gas Analysts. (Catalog 80). Burrell Technical Supply Co., 1936 5th Ave., Pittsburgh 19, Penna. 7½ x 10½ in. 96 pp.

This catalog is divided into two sections, a catalog proper of gas analysis apparatus manufactured by the company, classified according to types, and a manual of instruction on gas analysis and the proper use of the apparatus. The latter contains chapters on characteristics of some commercial gases, principles of gas analysis, assembling of the apparatus, preparing the apparatus for use, collection of gas samples, analytical procedure, calculations, and specialized gas analysis methods and apparatus. A bibliography on gas analysis and an index are included for convenience.

•

Surgical Trade Buyer's Guide: 1945. Surgical Business, Inc., 369 Lexington Ave., New York 17, N. Y. 6 x 9 in. 158 pp.

The sixth annual edition of this directory of sources of supply for surgical supply, hospital supply, and orthopedic appliance dealers brings up-to-date a comprehensive list of product classifications, arranged alphabetically, with the names of manufacturers and their addresses listed under each classification. In addition, a separate alphabetical list of all the manufacturers, with their addresses, has been provided for the reader's convenience.

•

The new *Ross Recirculating Indirect Air Heater* is described in a 4-page bulletin (No. 137) issued by the J. O. Ross Engineering Corp., 350 Madison Ave., New York 17, N. Y. This heater is said to possess a higher efficiency than other types owing to the use of a new principle described as "recirculation of gases."

FOR LOW HEAT BUILD-UP, USE PHILBLACK A
(FOR FURTHER DETAILS SEE AD ON PAGE 498)

EMULSIONS

FOR

Latex Compounding

Custom Made

To Meet Your Requirements

ALSO

CURING DISPERSIONS
LATEX TACKIFIERS
FILLER DISPERSIONS
ZINC OXIDE DISPERSIONS

ADHESIVE PRODUCTS

AFFILIATE
NEW YORK RUBBER CEMENT CO., INC.
(ESTABLISHED 1895)

SYNTHETIC RUBBER CEMENTS CORPORATION

1660 BOONE AVENUE
BRONX 60, NEW YORK

TRADE AGCHEM MARK

A Complete Service

to the

LATEX and EMULSION INDUSTRY

Surface active agents • Accelerators
Antioxidants • Plasticizers • Compounded latices, synthetic and natural • GR-S, Hycar and Neoprene compounds.

Agawam Chemicals Inc.

LABORATORY AND OFFICES AT
WEST SPRINGFIELD • MASSACHUSETTS

SULPHUR and CHEMICALS FOR THE RUBBER INDUSTRY

CRYSTEX insoluble SULPHUR

Commercial Rubbermakers' Sulphur, Tire Brand, 99½% Pure
Refined Rubbermakers' Sulphur, Tube Brand, 100% Pure
Carbon Tetrachloride, Carbon Bisulphide
Caustic Soda, Sulphur Chloride

*Aluminum Sulphate
Borax
Boric Acid
Citric Acid

*Copperas
Cream of Tartar
Chlorine
Muriatic Acid
Nitric Acid

Silicon Tetrachloride
Sodium Hydrosulphide
Stripper, Textile
Sulphur
Sulphuric Acid

*Superphosphate
Tartar Emetic
Tartaric Acid
Titanium Tetrachloride

(*Sold on West Coast Only)

Stauffer CHEMICALS SINCE 1885

STAUFFER CHEMICAL CO.

420 LEXINGTON AVE., NEW YORK 17, N. Y.
221 NO. LA SALLE STREET, CHICAGO 1, ILL.
624 CALIFORNIA ST., SAN FRANCISCO, CAL.
HOUSTON 2, TEXAS
555 SO. FLOWER ST., LOS ANGELES 13, CAL.
424 OHIO BUILDING, AKRON 8, OHIO
NORTH PORTLAND, OREGON
ORLANDO, FLORIDA

MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, AUGUST 9, 1945

Crude Rubber

DESPITE the general improvement in the over-all rubber program, the situation in respect to the supply of natural rubber still remains critical. In fact, according to the report submitted by John L. Collyer, president of the B. F. Goodrich Co., in resigning from his government position as Special Director of Rubber Programs, natural rubber constitutes the most serious single obstacle to the attainment of 1946 production objectives. Mr. Collyer pointed out that natural rubber usage is still in excess of imports from the producing areas in Allied hands, and estimated that the stockpile in this country would drop to 66,000 tons by the end of the year, far below the 100,000-ton minimum recommended as the safety zone.

Naturally, hope for essential natural rubber supplies in the near future lies in the liberation of certain Far Eastern rubber producing territories, particularly Malaya or Sumatra, and operating supplies and incentive goods vital to the resumption of rubber production in these areas are ready for use as soon as conditions permit. Because it is still generally believed that prewar equipment on plantations will be destroyed by the retreating enemy, mechanical equipment is being readied in this country for washing and drying the natural rubber which will initially be received from the Far East.

All of the plans laid to date take into recognition the possibility of extended warfare in the Pacific. There is, of course, the possibility that such warfare may end abruptly, in which case we would have almost immediate access to large quantities of natural rubber. As this is written, Russia has entered the war against Japan and the existence and use of the atomic bomb has been revealed.

Prices shown below are ceilings set by the Rubber Reserve Company:

	C	N-C
Plantations—		
Ribbed Smoked Sheets, 1X	22½	40
Thick Pale Latex Crepe, 1X	22½	40
Thin Pale Latex Crepe, 1X	22½	40
Thick Brown Crepe, 1X	21¾	38¾
Thin Brown Crepe, 1X	21¾	38¾
Thick Remilled Blankets, #1	21⅜	38⅞
Rolled Brown or Flat Bark	18	35½
Smoked Blankets, #1	21⅛	38⅜
Claro Brand 1XRSS	22½	40
Sole Crepe Trimmings	22	39¼
Sole Crepe	22½	40
Wild—		
Uncut Fines, Crude	15	29
Cut Fines, Crude	15½	29¾
Cut Fines, Washed & Dried	22½	40
Upriver Coarse, Crude	12¾	26⅛
Upriver Coarse, Washed & Dried	20¼	37¼
Caucho Ball, Crude	11⅝	24¾
Caucho Ball, Washed & Dried	19½	37
Guayule—		
Carload Lots	17½	31
Less than Carload Lots	18	31½
Balata—		
Surinam Sheet	42½	42½
Manaos Block	38¾	38¾
Colombian Block	38¾	38¾
Peruvian Prime	38⅝	38¾
Chicken Wire	23¼	23¼
Latex—		
Normal, Tank Car Lots	26	43½
Creamed, Tank Car Lots	26¾	44¼
Centrifuged, Tank Car Lots	27¾	45¼
Heat-Concentrated, Carload Drums	29½	47

C for Civilian Use; N-C for Non-Civilian Use.

Scrap Rubber

Dealers report that scrap rubber supplies are still in fairly good shape, although the usual summer lull is still apparent in collection circles. Considerable interest is being paid to proper methods to be adopted by scrap rubber splitters. It should be explained that these splitters are charged with the function of separating natural rubber scrap from synthetic products or those containing synthetics, and although tire markings have made it possible for most scrap dealers to segregate their rubber scrap it is apparent that the splitters have an important role in this picture. Since increasing quantities of scrap contain some synthetic material, the importance of the splitter's job cannot be overemphasized. Some dealers hope, however, that the increasing supply of new passenger tires will bring more and more old natural rubber tires to the scrap market, since such scrap is preferable to the entire industry. Prices shown below are ceilings on typical grades of scrap:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$20.00
Beadless truck tires	ton	26.00
Mixed truck tires	ton	20.00
Beadless passenger tires	ton	26.00
No. 1 passenger peelings	ton	52.25
No. 1 truck peelings	ton	52.25
No. 2 passenger tubes	lb.	.07¾
Red passenger tubes	lb.	.07½
Black passenger tubes	lb.	.06¾
Mixed passenger tubes	lb.	.06½
No. 2 truck tubes	lb.	.07½
Red truck tubes	lb.	.07¼
Black truck tubes	lb.	.06½
Buffings	ton	35.00
Bicycle tires	ton	15.00
Air bags and water bags	ton	15.00
Boots and shoes	ton	33.00

Tire Fabrics

The situation in the tire fabric field remains unchanged, with practically no demand for such fabrics. Consequently, prices are nominal and in many quarters are not even being quoted. The prices shown below are those which were in force on or about January 15, 1942.

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.43½ @	.44
Peeler, carded, 23/4/3	lb.	.44½ @	.45
Peeler, carded, 15/3/3	lb.	.41½ @	.42
Peeler, carded, 15/4/2	lb.	.41½ @	.42
Peeler, carded, 13/3/3	lb.	.40½ @	.41
CHAFERS			
Carded, American, 1 1/16"	lb.	.43½ @	.44
Carded, American, 1"	lb.	.39½ @	.48

Sheetings

48x40	36	in.	5.50	lb.	—	@ 8.272
40x40	36	in.	6.15	lb.	—	@ 7.398
40x36	36	in.	6.50	lb.	—	@ 7.000
48x48	40	in.	2.50	lb.	—	@17.200
48x48	40	in.	2.85	lb.	—	@15.087
56x60	40	in.	3.60	lb.	—	@12.638
48x44	40	in.	3.75	lb.	—	@11.733

Note: Prices shown above are ceiling prices set by order of the O.P.A.

Cotton

The price of middling uplands on the Cotton Exchange has swung in the narrow range of 42 points since our last report, high for the period being 23.54 on July 13 and low 23.12 on August 8. The average price of middling uplands on the Exchange for the month of July was 23.27, based on 25 trading days. Prices started a downward trend in mid-July, factors in the decline including recurring reports of Japanese peace feelers and the growing belief that the country was due for an immediate reconversion of industry. Heavy hedge selling and commission house liquidations also contributed to the trend. Prices strengthened somewhat toward the end of the month, due to price fixing and mill buying, but legislative and crop uncertainties in the past several days have again weakened the structure, with the result that yesterday's quotation (August 8) of 23.12 was the low point of the period. The market will probably continue uncertain until definite news of crop statistics is received and some apparent decision as to the length of the war in the Pacific is secured. Announcement of the Russian entry into the Japanese war did not upset the market too greatly. Unless the war should end suddenly, which is quite possible, large civilian demands for textiles are expected to more than compensate immediate military cutbacks. Quotations for middling uplands on the Exchange follow:

	July 11	August 9		
	Close	High	Low	Close
October	23.00	22.85	22.65	22.85
December	23.02	22.89	22.67	22.88
March, 1946	....	22.86	22.64	22.85

Reclaimed Rubber

Despite the usual summer slack, occasioned by vacations, closings for inventory purposes, shutdowns for machinery and equipment repair, etc., the demand for reclaim continues at peak levels. Even the labor disturbances of the past few weeks, which included work stoppages at many large and small plants throughout the country, has not caused any perceptible decline in demand. Well aware of the fact that the war in the Pacific may end abruptly, especially following announcement of Russia's entry and disclosure of the atomic bomb, reclaimers look for no falling off in the demand for reclaim and are continuing efforts to increase production. Manpower is still the prime difficulty in this regard. Prices shown below are ceilings on typical grades of reclaim:

Shoe			
Unwashed	lb.	.07½ @	.07¾
Tube			
Black Tube	lb.	.11¾ @	.12
Red Tube	lb.	.12½ @	.12¾
Tires			
Black (acid process)	lb.	.08 @	.08¼
Black, selected tires	lb.	.07 @	.07¼
Truck, Heavy Gravity	lb.	.09 @	.09¼
Miscellaneous			
Mechanical blends	lb.	.05 @	.06
White	lb.	.13½ @	.13¾

Ducks

Enameling (single filling)	lb.	— @	.44¼
Belting and Hose	lb.	— @	.39
Single filling, A grade	lb.	— @	.19¼
Double filling, A grade	lb.	— @	.20¼

Carey

MAGNESIA

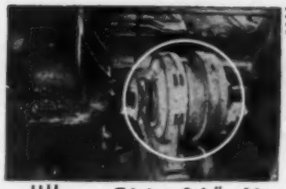
OXIDES AND CARBONATES
LIGHT AND HEAVY • FOR
TECHNICAL & DRUG USES

THE PHILIP CAREY MFG. COMPANY

BRANCHES IN ALL PRINCIPAL CITIES

Lockland, CINCINNATI 15, OHIO

Wm. S. GRAY & CO. DISTRIBUTORS NEW YORK CITY



Stearns MAGNETIC

CLUTCHES AND BRAKES
CLUTCH - BRAKE COMBINATIONS

This 24" diameter STEARNS Magnetic Clutch and Brake Unit is providing smooth start and positive stop on a rubber mill in a prominent mid-western plant. Efficient, economical and safe, sizes and combination to meet requirements. Write for bulletin 225.

If you have a tramp iron problem ask for our Bulletin 301 on Magnetic Pulleys, improved, air-cooled, latest design. Sizes to fit your conveying system or self-contained unit.
We invite your inquiries. Outline your problem. No obligation.

STEARNS MAGNETIC MFG. CO.
640 So. 28th St. Milwaukee (4), Wis.

RMP ANTIMONY

• ATTRACTIVE
• NON-DETERIORATING

for RED RUBBER

RARE METAL PRODUCTS CO.
BELLEVILLE, N. J.

CONTINENTAL-MEXICAN RUBBER CO., Inc.
745 Fifth Ave., New York City

Producer in Mexico of

GUAYULE RUBBER

Washed — AMPAR BRAND — Dried

Formerly Distributed By
CONTINENTAL RUBBER COMPANY OF NEW YORK
An Affiliated Company

SOFTENERS and PLASTICIZERS
For RUBBER
From the Pine Tree

ROSIN OIL
PINE TAR
BURGUNDY PITCH
GALEX a non-oxidizing RESIN
Send for "Pine Tree Products" *Booklet*

NATIONAL ROSIN OIL & SIZE CO.
R. K. O. BUILDING, RADIO CITY, NEW YORK, N. Y.
Plant: Savannah, Ga. Branches in Principal Cities
"PIONEERS OF THE INDUSTRY"

COLORS for RUBBER

Red Iron Oxides
Green Chromium Oxides
Green Chromium Hydroxides

•

Reinforcing Fillers and Inerts

C. K. WILLIAMS & CO.
EASTON, PA.

METALLURGICAL SERVICE CO.

PROCESS ENGINEERS — COMMERCIAL CO. HEAT TREATERS — INDIANAPOLIS 2, INDIANA

RUBBER DENUDING

WITHOUT AFFECTING THE PHYSICAL PROPERTIES OF METAL INSERTS

• • •

SUBMIT TRIAL SAMPLES

Let us estimate on your

CUTTING DIES

• Years of experience making dies of all kinds for rubber manufacturers enable us to offer you correctly designed dies of tempered steel which retain their cutting edges....*Send blue print for quotation.*

BROCKTON CUTTING DIE & MACHINE CO. INC.
CUTTING AND PERFORATING DIES

AVON, MASS.

CHEMICAL MARKETS

New York, Aug. 9, 1945
All Prices F.O.B. Works

ACCELERATORS

Organic

A-1 (Thiocarbanilid)	lb.	.28	.33
A-10	lb.	.36	.42
A-19	lb.	.52	.58
A-32	lb.	.60	.70
A-77	lb.	.42	.55
A-100	lb.	.42	.55
Aldehyde ammonia, crystals	lb.	.65	.70
Altax	lb.	.39	.41
Beutene	lb.	.59	.64
B-J-F	lb.	.34	.39
Butasan	lb.	—	1.10
Butyl Zimate	lb.	—	1.10
Captax	lb.	.34	.36
Cryiene	lb.	.40	.47
Di-Ortho-Tolyguanidine	lb.	.44	.46
Diphenylguanidine	lb.	.35	.41
El-Sixty	lb.	.36	.43
Ethasan	lb.	—	1.10
Ethyl Tuads	lb.	—	1.25
Ethyl Zimate	lb.	—	1.10
Ethylidine aniline	lb.	.42	.43
Formaldehyde aniline	lb.	.31	—
Guantal	lb.	.39	.48
Hepteen	lb.	.34	.39
Hexamethylenetetramine	lb.	.33	—
Lead Oleate, No. 999	lb.	.13	—
Witco	lb.	.15	—
Ledate	lb.	—	1.20
Methasan	lb.	—	1.20
Methyl Tuads	lb.	—	1.25
Methyl Zimate	lb.	—	1.20
Monex	lb.	—	1.25
Pentex	lb.	.74	.84
Phenex	lb.	.49	.54
Pip-Pip	lb.	—	1.63
R & H 50-D	lb.	.42	.43
R-2 Crystals	lb.	—	1.55
Rotax	lb.	.44	.46
Satex	lb.	1.13	1.43
Santocure	lb.	.60	.67
Selenac	lb.	—	1.60
SP-DX-G	lb.	.53	.58
Super-Sulfur No. 2	lb.	.13	.15
Thiocarbanilid, drums	lb.	.28	.33
Thiofide	lb.	.39	.46
Thiotax	lb.	.34	.41
Thiurad	lb.	—	1.25
Trimene	lb.	.54	.64
base	lb.	1.03	1.18
Triphenylguanidine	lb.	.45	—
Ulto	lb.	.99	1.04
Ureka	lb.	.50	.57
Blend B	lb.	.50	.57
Blend C	lb.	.48	.55
Vulcanex	lb.	.42	.43
Vulcanol	lb.	.85	—

Inorganic

Litharge, domestic	lb.	.07	.07½
Magnesia, calcined, heavy	lb.	.04	—

COLORS

Blues [b]			
Prussian	lb.	.36	—
Ultramarine	lb.	.17	.27
Browns [b]			
Mapico	lb.	.1135	—
Umber, Turkey	lb.	.04¼	—
Greens [b]			
Chrome	lb.	.23	—
Guignet's Green	lb.	.70	—
Reds			
Antimony crimson, 15/17	lb.	—	—
Indian	lb.	.08¾	—
Domestic (Maroon)	lb.	.11	—
Mapico	lb.	.096	—
Red oxide, pure	lb.	.10	.12
Rub Er Red	lb.	.09¾	—
Whites [b]			
Cryptone No. 19	lb.	.0560	.0585
Cryptone CB No. 21	lb.	.0560	.0585
Cryptone ZS-800	lb.	.0825	.0850
Lithopone:			
Albalith	lb.	.04¼	.04½
Astrolith	lb.	.04¼	.04½
Azolith	lb.	.04¼	.04½
Ray-cal	lb.	.05½	.05¾
Rayox	lb.	.14½	.15¾
Titanox A	lb.	.14½	.14¾
Titanox B	lb.	.05¾	.06
Titanox C	lb.	.05½	.05¾
Zinc Oxide—American Process [b]			
American Azo:			
ZZZ (lead free)	lb.	.07¼	.07½
Anaconda, lead free	lb.	.07¼	.07½
Horsehead Lead Free Brand:			
Special—3	lb.	.07¼	.07½
XX Red—4	lb.	.07¼	.07½
Kadox, black label—15	lb.	.07¼	.07½
Red label—17	lb.	.07¼	.07½
72	lb.	.07¼	.07½
St. Joe, black label	lb.	.07¼	.07½
green label	lb.	.07¼	.07½
red label	lb	.07¼	.07½
U. S. P.—7, bbls.	lb	.10½	.10¾
Zinc Oxide—French Process: [b]			
Florence White Seal—7 bbl.	lb.	.09½	.09¾
Green seal—8	lb.	.09	.09¼
Red seal—9	lb.	.08½	.08¾
Yellows [b]			
Caumolith	lb.	.55	.60
Chrome	lb.	—	.50
Mapico	lb.	.071	—

BLACKS

(In bags, carload lots)

Arrow Compact	.0355	—
Atlantic	.0355	—
Certified	.0355	—
Certified Spheron	.0355	—
Continental	.0355	—
Disperso	.0355	—
Dixiedensed	.0355	—
Dixiedensed 66	.0355	—
Excello	.0355	—
Furnex	.03½	.06
Furnex Beads	.03½	.06
Gastex	.03½	.06
Kosmobile	.0355	—
Kosmobile 66	.0355	—
Kosmos-Dixie 20	.03½	.06
Micronex (Amarillo)	.0355	—
Micronex Beads (Amarillo)	.0355	—
Pelletex	.03½	.06
P-33	.04	.06½
Philblack A	.05	—
Shell Carbon (Del. Midwest)	.0240	—
Sterling	.035	—
Supreme	.0355	—
Thermax	.0225	.05
Wyex	.0355	—

COMPOUNDING MATERIALS

Aluminum Flake	ton	18.00	24.50
99½%-300	ton	—	16.50
86-90%-300	ton	—	13.50
Asbestine	ton	16.50	20.00
Atomite	ton	—	27.50
Barium carbonate (98-100%)	ton	47.00	49.00
Barytes	ton	25.35	36.00
Bentonite	ton	11.00	16.00
Blanc fixe, dry	ton	60.00	67.00
Calcene	ton	37.50	43.00
Catalpo (fact)	lb.	.02	—
Clay, Aerfloted, Suprex	ton	11.00	23.50
Aerfloted Paragon	ton	10.00	22.50
Champion	ton	—	11.00
Crown	ton	—	11.00
Dixie	ton	11.00	23.50
Kaolloid	ton	—	9.00
Langford	ton	—	8.50
Magnolia	ton	—	10.00
McNamee	ton	10.00	22.50
Par	ton	—	11.00
Witco	ton	10.00	—
Kalite No. 1	ton	26.00	52.00
Kalvan	ton	100.00	126.00
Keystone white	ton	—	14.00
Magnesium carbonate	lb.	.06¼	—
Mineralite	ton	—	30.00
Pyrax A	ton	—	8.10
Rottenstone (powd. Dom.)	ton	25.50	37.50
Rubberol	lb.	—	.17½
Silene EF (calcium silicate)	lb.	.055	.06
Silical	ton	65.00	85.00
Snowflake white	ton	—	16.00
Talc, domestic	ton	14.50	—
Whiting, commercial	ton	16.00	26.00
Witco	ton	—	6.50
Witcarb R	ton	—	100.00
Witcarb R-12	ton	—	40.00
Wood Flour (100 mesh)	ton	30.00	32.00

MINERAL RUBBER

285°-300° Mineral Rubber	ton	25.00	27.00
Black Diamond	ton	25.00	—
Dielex	lb.	—	.06
Hard Hydrocarbon	ton	25.00	27.00
MilliMar	lb.	—	.05½

MISCELLANEOUS

Aromatics—Rodo #0	lb.	4.00	4.50
Rodo #10	lb.	5.00	5.50
Curodex 19	lb.	2.75	—
Curodex 188	lb.	3.50	—
Curodex 198	lb.	4.50	—
Para-Dors	lb.	4.50	—
Areaklene No. 375	lb.	.35	.50
Darvan (dispersing agent)	lb.	.30	.39
Santomerse S	lb.	.11	.25
Sponge Paste	lb.	—	.18
Sunproof	lb.	.22¾	.27¾
Tonox	lb.	.50	.59
Ty-Ply	gal.	6.75	8.75
Unicel (blowing agent)	lb.	.50	—

SOFTENERS

Acids			
Acetic, 28%, bbls.	100 lb.	3.38	3.63
Nitric, 36 degrees	cwt.	5.00	—
Acids, Fatty			
Laurex	lb.	.14¾	.17¾
SL-20	lb.	.11	.13
Stearex Beads	lb.	.10	.11
Stearite	lb.	.10	—
Alkalies			
Caustic Soda, 76%	cwt.	2.70	5.70
Soda Ash, 58%	cwt.	1.15	2.98
Oils			
Degras, bbls.	lb.	.10	.12
Para-Flux	gal.	.17	.18
Para-Luxe	lb.	.046	.048
Petrolatum, amber	lb.	.03¼	—
Pigmentarol, tank cars	gal.	.20½	—
in drums	gal.	.26½	.27¾
Pine, tanks	gal.	.55	—
Rosin Oil, cmpd.	gal.	.40	—
Rubberol	lb.	.13½	.14
Rubtack	lb.	.10	—
Seedine, c.l.	lb.	.07¼	—
Witco Palm Oil	lb.	—	—
Witco Softener No. 20	gal.	.20	—
Woburn No. 8, c.l.	lb.	.06	—
Resins and Pitches			
Pitch, Burgundy	lb.	.08	—
coal tar	ton	19.00	22.00
hardwood	ton	16.00	22.50
pine, 200 lb. gr. wt.	bbl.	—	4.50
Pigmentar, tank cars	gal.	.20½	—
in drums	gal.	.26½	.27¾
Retort Pine Tar, drums	gal.	.26½	.27¾
Solvents			
Acetone, pure	lb.	.07	—
Benzene, 90%, tank car	gal.	.14	—
Beta-Trichlorethane	gal.	—	.30
Bondogen	lb.	.98	1.25
Carbon, bisulfide	lb.	.05	.0834
Carbon tetrachloride	gal.	.73	1.27
Dichloroethylene	lb.	—	—
Dipentene, cml., drums	gal.	.48	.50
Ethylene dichloride	lb.	.07½	.08¾
Plastogen	lb.	.07¾	.12
Reogen (drums)	lb.	.11½	.15
Rub-Sol	gal.	.09½	—
Trichlorethylene	lb.	.08	.09¼
Turpentine, steam dist., drums	gal.	.80	.83
Waxes			
Antisol	lb.	.22½	.23½
Beeswax, white	lb.	.58	—
Carnauba, yellow	lb.	.83¼	—
Ceresin, white, dom.	lb.	.13½	.15
Montan, dom.	lb.	.30	.35
Paraffin			
Yellow crude scale, 124/126	lb.	.04¼	—
Refined, 120/122	lb.	.05¼	—

ANTI-OXIDANTS

Agerite Alba	lb.	1.95	2.05
Gel	lb.	.52	.54
Hipar	lb.	.61	.63
Powder	lb.	.40	.42
Resin	lb.	.43	.45
Resin D	lb.	.40	.42
White	lb.	1.23	1.33
Albasan	lb.	.69	.74
Antox	lb.	.54	.56
B-L-E	lb.	.40	.49
Flectol H	lb.	.40	.47
Neozone A, C, D, E	lb.	.40	.63
Oxynone	lb.	.77	.90
Retardex	lb.	.44½	.47½
Santoflex B	lb.	.40	.47
Santoflex BX	lb.	.54	.61
Santovar O	lb.	1.15	1.40
S.C.R.	lb.	.32	.34
Stabilite	lb.	.48	.50
Stabilite Alba	lb.	.69	.74
VGB	lb.	.43	.52

EXTENDERS

Naftolen R-100	lb.	.10	.12

LUBRICANTS—MOLD & RUBBER SURFACE

Areaklene	lb.	.35	.50
Cocoa Soapstock	lb.	.06	.08
Colite	gal.	.90	1.15
Dipex	lb.	.06	.08
Glycerized Liquid Lubricant	gal.	—	1.35
Lubrex	lb.	.25	.30
Mineralite	ton	—	30.00
Sericite	ton	65.00	75.00
Soap Tree Bark, cut, sifted	lb.	.06	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.25	—
Amberex Type B	lb.	.18¾	—
Black	lb.	.08½	.13
White	lb.	.09	.15
Brown	lb.	.10	.14
Neophax A	lb.	.16½	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.08	.12
Sulfur Chloride, yellow (drs.)	lb.	.03	.08½
Sulfur, rubber makers			
Refined (bags)	cwt.	2.55	—
Commercial (bags)	cwt.	2.20	—
Telloy	lb.	1.75	—
Vandex	lb.	1.75	—
Vultac No. 1	lb.	.38	.45
Vultac No. 2	lb.	.38	.45
Vultac No. 3	lb.	.42	.49

[a] Price Ceilings.
[b] Price Suggestions or Agreements.

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HELP WANTED (Continued)

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WANT ADS

(Continued)

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Also See Page 514

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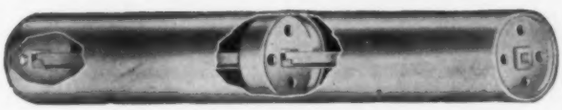

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Sorting and segregating natural rubber from synthetic scrap has become an added function of the Scrap Rubber industry. Skilled workmen at a Schulman plant are shown here, separating natural rubber carcasses from synthetic treads with careful precision. It's part of Schulman's modern method of handling Scrap Rubber to produce exactly what you need, exactly as you specify it. Be *safe* with Schulman.

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